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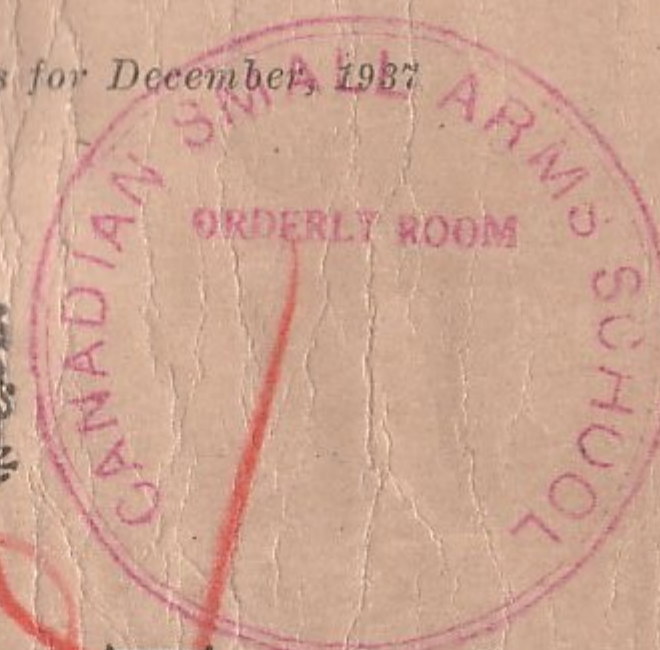
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Notified in Army Orders for December, 1937



Small Arms Training

Volume I, Pamphlet No. 9

MORTAR (3-inch)

1937

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OTTAWA
J. O. PATENAUDE, I.S.O.
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1940

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1940

By Command of the Army Council,

H. J. CREEDY.

THE WAR OFFICE,

31st December, 1937.

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DEFINITIONS

Auxiliary aiming mark.—An aiming mark selected by the fire controller for the purpose of giving or maintaining direction for the mortar.

Deflection.—A lateral displacement of the line of fire.

Fire control.—The necessary arrangements and orders for engaging the target.

Fire controller.—The person responsible for giving the orders to the men of a fire unit for the engagement of a target.

Fire direction.—The term applied to instructions given by the commander of more than one fire unit to the fire unit commanders, as to how their fire is to be applied.

Fire for effect.—The term applied to fire used for neutralizing or destroying a target, when ranging has been completed.

Fixed line.—A term denoting that measures have been taken for maintaining elevation and direction in darkness, smoke, etc., so that bombs will fall on a pre-arranged area of ground.

Flanking fire.—Fire applied from a flank across the front of a locality occupied by our own troops or, if they are advancing, at an angle to their advance.

In action.—A mortar is said to be "In action" when it is mounted and laid with men and ammunition present ready to open fire.

Laying.—The process of elevating (or depressing) and traversing a mortar until its axis is made to point in the required direction. On conclusion of this process the mortar is said to be laid.

Line.—The direction in which a mortar is pointed.

Line of fire.—The direction of the target from the mortar.

Mean point of impact (M.P.I.).—The point round which bombs fired at the same elevation will group themselves.

Observed fire.—Fire which can be observed from the observation post.

Observation post.—A post from which a particular area can be kept under observation and from which mortar fire can be controlled and corrected.

Overhead fire.—Fire which passes over the heads of our own troops.

Point of origin.—The point from which a smoke screen is generated by successive bursts of smoke bombs.

Position in readiness.—The place at which the mortar and stores are taken off the vehicles and prepared for action.

Ranging.—The process of adjusting the elevation and line by observation of the bombs bursting so that the M.P.I. and the target are brought into coincidence.

Rendezvous.—A pre-arranged place of assembly.

Trajectory.—The curve described by the bomb in its flight.

Zero line.—A line of reference from which switches are measured.

WET WEATHER PRECAUTIONS

1. Great care will be taken to ensure that no water is allowed to enter the barrel before or during firing. If it is thought that water has entered the barrel before firing begins, then the first bomb will be fired without removing the safety cap on the fuze.

Note.—In peace training the first bomb fired under the above conditions will be a dummy bomb.

2. Gun numbers will ensure that no water is allowed to reach the holes in the cartridge container through which the flash passes from primary to augmenting cartridges.

GENERAL

SECTION 1.—PUBLICATIONS DEALING WITH THE MORTAR

1. The general principles governing the tactical use of the 3-inch mortar are dealt with in Field Service Regulations, Vol. II, and Infantry Training. The details of the equipment, stores and ammunition, are dealt with in the Handbook for the M.L. 3-inch Mortar. Ranges safety is dealt with in S.A.T., Vol. V.

2. This pamphlet deals with the technical training of mortar platoons.

SECTION 2.—CHARACTERISTICS

1. i. The mortar has a very high trajectory. Its elevations are between 45 degrees and 80 degrees.
- ii. The burst of the H.E. bomb is effective for 100 yards all round from the point of impact.
- iii. The mortar ranges from 275 yards to 1,600 yards.
- iv. It is extremely flexible and has a traverse of 36 degrees on the traversing gear.
- v. It is easy to conceal and is capable of being fired behind high cover.

- vi. It can be fired at night or when blinded by fog or smoke.
- vii. It is capable of sustained fire without excessive overheating.
- viii. The flash is negligible.
- ix. It has a long time of flight—average 20 seconds.
- x. It is seriously affected by damp, and it is therefore essential that both barrel and cartridges be kept dry.

SECTION 3.—HANDLING

1. The technical handling of the mortar is extremely simple. It is loaded and fired by placing a bomb in the mouth of the barrel and allowing it to slide down to the bottom, where the striker explodes the charge. By observing certain rules of fire control it is a simple matter rapidly to obtain fire effect.

2. The success or failure of its handling, however, will depend almost entirely on the training of the N.C.O. in command of the mortar detachment and the individual skill and team work of the members of the detachment.

3. The detachment commander must be full of initiative and have a good eye for country. He should be full of restless curiosity so that he can get his detachment into action to fulfil the role required of it in the shortest possible time. On completion of his task he must regain touch at once with his immediate commander with a view to offering further support.

4. The mortar and its ammunition will normally be carried on a vehicle.

When off the vehicle, the mortar requires three men to carry it.

1 No. 1 carries the base-plate and sight—weight 37 lb.

2 No. 2 carries the barrel and spare parts bag—weight 44 lb.

10 2 No. 3 carries the bipod—weight 44½ lb.

These loads are heavy and awkward and can only be man-handled for short distances.

2 One bomb weighs 10 pound; a maximum man load is six bombs.

SECTION 4.—ORGANIZATION

1. In war the mortar platoon consists of a headquarters and two sections, each of two mortar detachments. It is commanded by a subaltern with a serjeant as second-in-command.

2. The section is commanded by a serjeant and the detachment by a corporal with a lance-corporal as second-in-command. The detachment consists of one orderly and five mortar members.

3. The fire unit is the detachment, though a section may be used as a tactical unit. The use of the whole platoon as one tactical unit will be exceptional.

SYLLABUS OF TRAINING

SECTION 5.—MORTAR RECRUIT'S COURSE

1. Syllabus.

<i>Subject</i>	<i>Lesson numbers</i>
General description..	1
Ammunition..	2
Maintenance..	3
Aiming and laying..	6 to 10
Signals..	11
Elementary mortar drill.. . . .	13 to 27
T.O.E.D.	
Packing the vehicle	28
Detachment drill..	29 to 32, 34, 35 to 40
Fire control..	General lecture
Smoke drill..	61

2. A suggested sequence of instruction.

Lessons:—1, 13, 14, 15, 6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 10, 11, 23, 24, 25, 26 and 27.

T.O.E.D.

Lessons:—3, 28, 29, 30, 31, 32, 29, 31 and 32.

General lecture on fire control.

Lessons:—2, 34, 35, 40 and 61.

SECTION 6.—FIRE CONTROLLER'S COURSE (MORTAR TRAINED PERSONNEL)

1. Syllabus.

<i>Subject</i>	<i>Lesson numbers</i>
Testing and adjustment of the sight..	4 and 5
Signals..	12
Reconnaissance..	36
Field duties..	37 to 44
Fire control (practical).. . . .	33
Fire control (theoretical	45 to 63

2. A suggested sequence of instruction.

Lessons:—4, 5, 45, 46, 47, 36, 37, 38, 48, 51, 36, 49, 51, 37, 38, 36, 39, 40, 50, 52, 53, 51, 41, 43, 42, 41, 44, 42, 62, 54, 33, 55, 33, 56, 57, 58, 33, 59, 60, 63, 61, 51 and 33.

SECTION 7.—FIRE CONTROLLER'S COURSE (PERSONNEL NOT TRAINED IN THE MORTAR)

1. Syllabus.

<i>Subject</i>	<i>Lesson numbers</i>
General description	1
Ammunition	2
Maintenance	3
Aiming and laying	6 to 10
Signals	11 and 12
Elementary mortar drill	13 to 27
T.O.E.D.	
Packing the vehicle	28
Detachment drill	28 to 32, 34 and 35
Testing and adjustment of the sight	4 and 5
Reconnaissance	36
Field duties	37 to 44
Fire control (practical)	33
Fire control (theoretical)	45 to 63

2. A suggested sequence of instruction.

Lessons: 1, 13, 14, 15, 6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 22, 10, 11, 23, 24, 25, 26 and 27.

T.O.E.D.

Lessons: 2, 11, 3, 45, 28, 46, 29, 47, 30, 12, 48, 31, 49, 32, 50, 51, 33, 4, 5, 52, 53, 62, 54, 33, 51, 34, 35, 55, 51, 36, 37, 38, 56, 36, 39, 40, 57, 58, 33, 59, 60, 41, 36, 42, 63, 61, 43, 44, 41, 51, 42 and 33.

SECTION 8.—SUMMARY OF HOURS

1. Mortar recruit's course.

<i>Subject</i>	<i>Hours</i>
Elementary drill	15
Tests of elementary drill	2
Aiming and laying	5
Detachment drill	10
Miscellaneous	7
Total	39

2. Fire controller's course (Mortar trained personnel).

Subject	Hours
Testing and adjustment of the sight	2
Reconnaissance	3
Field duties	11 (If emplacement is not dug.)
Fire control (practical)	4
Fire control (theoretical)	22
Signals	1
Total	43

3. Fire controller's course (Personnel not trained in the mortar).

Subject	Hours
Elementary drill	15
Tests of elementary drill	2
Aiming and laying	5
Detachment drill	6
Testing and adjustment of the sight	2
Reconnaissance	3
Field duties	11 (If emplacement is not dug.)
Fire control (practical)	4
Fire control (theoretical)	22
Signals	1
Miscellaneous	5
Total	76

SECTION 9.—ANNUAL PRACTICE

1. The amount of ammunition allotted for mortar practice will be notified annually.

2. The annual practice is divided into three parts and eight fire controllers should be exercised in each part annually.

3. The selection of the personnel to be exercised in each part will depend on the amount of experience already gained by the N.C.Os. of the mortar platoon. In a trained platoon Parts II and III should normally be fired by the four permanent detachment commanders and the four permanent detachment corporals; while Part I should be reserved for first year fire controllers, understudies and detachment orderlies.

4. Part I.—

Number of shoots	Number of fire controllers exercised	Nature of shoots	Subjects to be practised
(1) 8	(3) 8	(3) Simple point targets with the observation post within voice control of the mortar.	(4) Fire control. Fire-discipline.

NOTES:—The eight fire controllers should be assembled at the observation post and the platoon commander should discuss the conduct of each shoot in turn.

2. Four mortar numbers only are required at the mortar; the remainder should be assembled in rear under the platoon sergeant in a position from which they can watch the fire discipline. The four numbers at the mortar should be changed for each shoot.

5. Part II.—

Number of shoots	Number of fire controllers exercised	Nature of shoots	Subjects to be practised
(1) 8	(2) 8	(3) Eight separate detachment exercises starting from the position where the rifle comdr. gives the mortar task to the mortar detachment comdr. The tasks given to be either a smoke shoot or the neutralization of a small area.	(4) Casualties. Long control. Anti-gas measures. Safety problems.

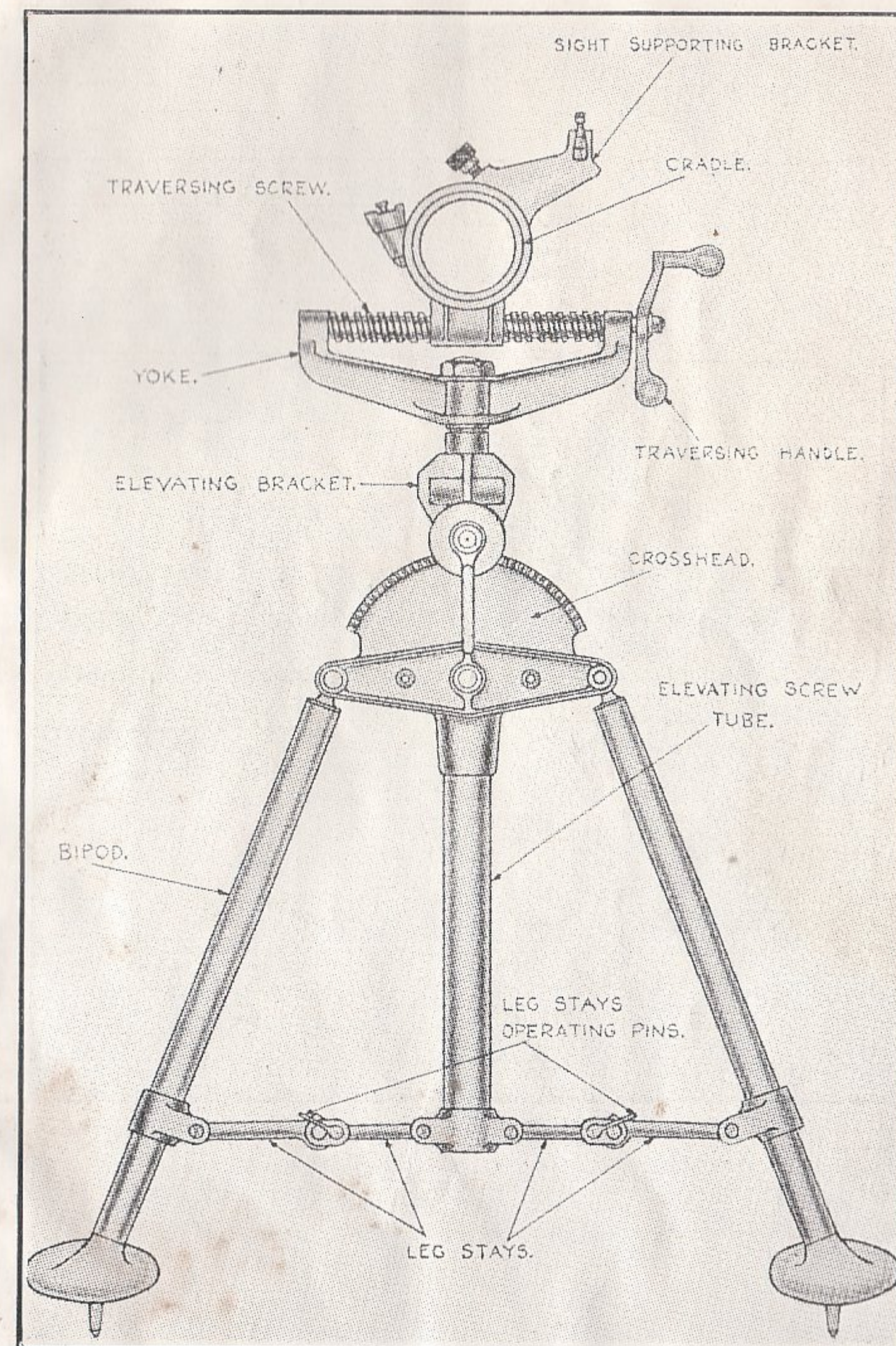
NOTE.—The tactical situation should be changed often enough to ensure that no detachment comes into action more than once over the same piece of ground.

6. PART III.—

Number of shoots	Number of fire controllers exercised	Nature of shoots	Subjects to be practised
(1)	(2)	(3)	(4)
8	8	Four separate section exercises, each entailing one shift from both detachments of the section. Exercises to start from the position where the rifle comdr. gives the first task to the mortar section commander and to end when the second detachment has completed its task. Tasks given to be either a smoke shoot or the neutralization of a small area.	Casualties. Long control. Long carry. Anti-gas measures. Safety problems.

NOTE.—The exercises should be designed to bring out the procedure of leap-frogging the mortar detachments of a section during an action.

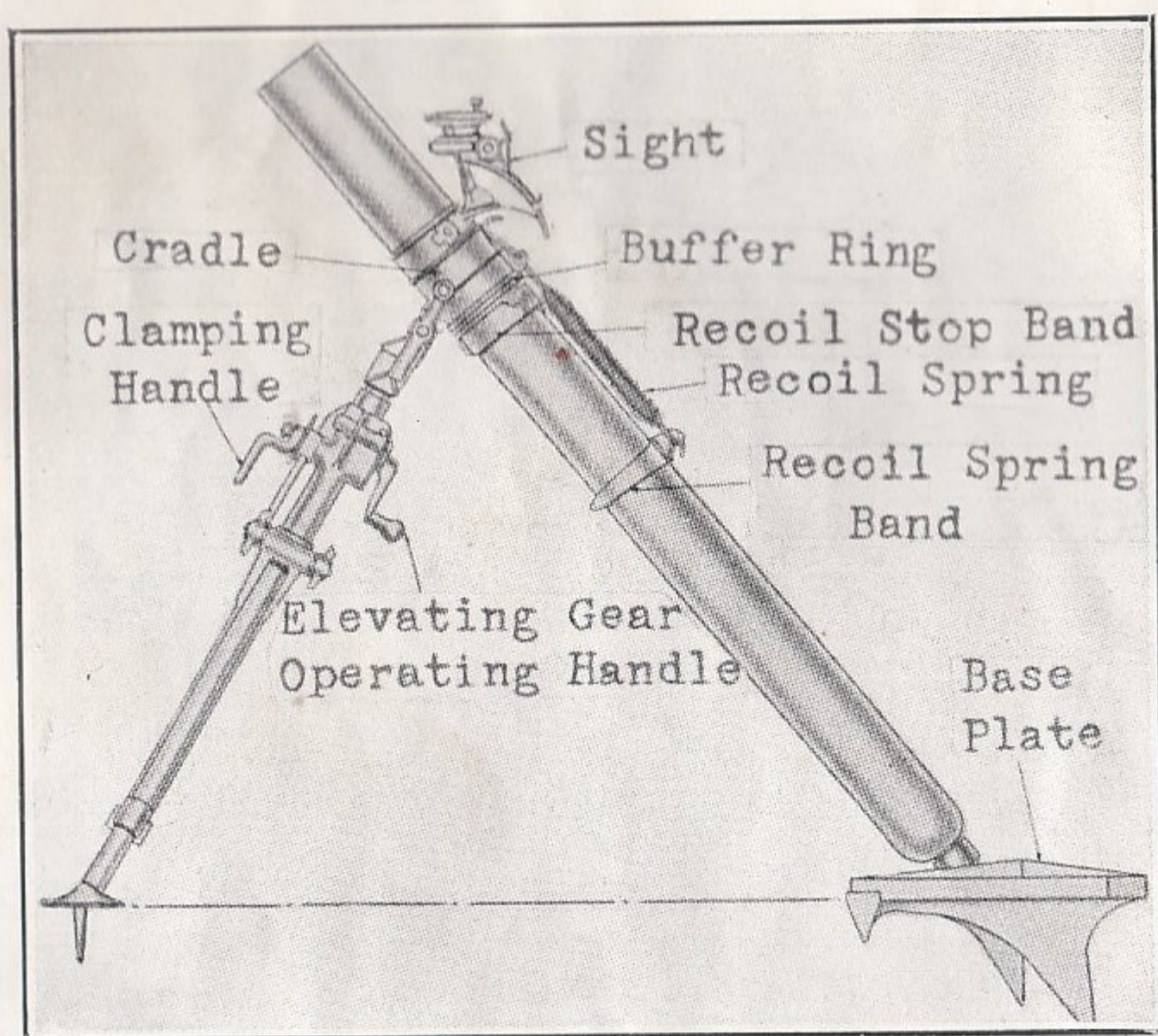
MOUNTING, 3-IN. MORTAR, MARK I PLATE I



[To face page 8

ORDNANCE. M.L. 3-IN. MORTAR, MARK II, ON
MOUNTING 3-IN MORTAR, MARK I
(General Arrangement)

PLATE II



[To face page 9.

MECHANICAL SUBJECTS

SECTION 10.—GENERAL DESCRIPTION

(See Plates I and II)

LESSON 1.—GENERAL DESCRIPTION

Instructor's Notes

Stores:—

Mortar complete.

1. **General.**—The mortar differs mainly from guns and howitzers in being shorter, lighter and simpler in construction. As a result the chamber pressure and consequently the range of the projectile are considerably less than with artillery weapons. The 3-inch mortar also differs from the modern gun and howitzer in being a muzzle loading and smooth bore weapon. This necessitates the projectile being rather smaller in diameter than the bore of the mortar with a consequent loss of propellant gases.

2.i. Show to the squad the base-plate, barrel and bipod.

Explain:—

- (a) That the breech end of the barrel fits into the base-plate, which takes the shock of firing.
- (b) That the bipod is designed to form a firing support for the barrel.

ii. Assemble the mortar.

Explain:—

- (a) The elevating gear, and show how the mortar is elevated and depressed by means of the operating handle.
- (b) The traversing gear, and show how a limited amount of traverse is obtained without moving the legs of the bipod.

iii. Lock the sight on to the bracket.

Explain:—

- (a) That the sight is provided for laying the mortar by indirect means.
- (b) That it provides an all round field of view for laying for line.
- (c) That, by means of the range scale and the longitudinal bubble, the mortar is laid to the required quadrant elevation.

iv. Point out the cross-levelling gear.

Explain:—

- (a) That the sight must be kept in the vertical plane.
- (b) That the cross-level bubble is provided to compensate for difference in level of the bipod legs and/or the effect of traverse.
- (c) That, when the cross-level bubble is central, the sight is vertical.

v. Name the remaining principal parts and explain their functions. These are:—

- (a) Leg stays and locking pins.
- (b) Clamping handle.
- (c) Cradle.
- (d) Clinometer plane.
- (e) Buffer ring.
- (f) Recoil stop band.
- (g) Recoil spring.
- (h) Recoil spring band.
- (i) Breech piece.
- (j) Striker stud.

SECTION 11.—AMMUNITION

LESSON 2.—AMMUNITION

Instructor's Notes

Stores:—

- One dummy bomb (H.E.).
- One dummy bomb (Smoke).
- One dummy primary cartridge.
- Six dummy augmenting cartridges.

1. **General.**—There are two types of service ammunition, the H.E. bomb and the smoke bomb. Both range in the same manner, are stream-lined in shape and are threaded at the head to receive the fuze and at the base to receive the tail unit. Into the tail unit are fitted the primary and augmenting cartridges.

The bombs are carried in expendable carriers, each containing three bombs, and a tinned-plate cup and waterproof cover are fitted over the tail unit to ensure that the cartridges are protected from damp.

2. **Markings:**—

- i. *The H.E. bomb.*—Immediately below the fuze there is a red ring which denotes that the bomb is filled, and below this red ring there is a green band which denotes that the bomb is filled with H.E.
- ii. *The smoke bomb.*—Immediately below the fuze there is a red ring which denotes that the bomb is filled, and below this red ring the whole head of the bomb is painted green, which denotes that the bomb is filled with a smoke producing chemical.

3. **The charges:**—

- i. Show how the primary charge is fitted into the cartridge container and how the augmenting cartridges are held between the vanes of the tail unit. Show that the augmenting cartridges are easily detachable in order to allow of the mortar being fired with charge 1 (3 augmenting cartridges).
- ii. Explain how the flash passes from primary to augmenting cartridge.

4. **The fuze:**—

- i. Explain the function of the safety cap.
- ii. Explain that, on impact with a hard substance, it is the action of the fuze that detonates the bomb.

SECTION 12.—MAINTENANCE

LESSON 3.—MAINTENANCE

Instructor's Notes

Stores:—

Mortar complete. Cleaning rod.

1. **The barrel.**—The barrel must be kept clean and free from rust, and the bore slightly oiled. After continuous firing, when opportunity permits, the breech piece with striker should be removed and the bore should be thoroughly washed out with fresh hot water and allowed to drain. It should then be dried out and, when cool, oiled by means of a cloth tied over the cleaning rod. The breech piece with striker stud should be cleaned and oiled. In re-assembling, the copper washer must be in position and the breech piece tightly screwed home.

The clinometer plane must not be cleaned with abrasive material such as emery cloth, scratch card or bath brick. Any rust on the plane will be loosened by a coat of paraffin and then rubbed off with cotton waste. Care must be taken to prevent the

plane being damaged or burred and, if it is unlikely that the mortar will be used for some considerable time, it should be coated with mineral jelly.

2. The mounting.—The mounting must be kept clean and all working parts such as the elevating, traversing and cross-levelling gears well lubricated. The recess in the base-plate, which receives the rear end of the breech piece, must be kept free from earth. Locking bolts must be examined to ensure that they have not worked loose and that the locking pins are functioning correctly.

3. The sight.—The sight must be handled with great care and all parts kept clean; the working parts must be lubricated with clean oil.

In order to keep the sight and clinometer in perfect condition, they will be kept in their respective cases when not in use.

4. Points before, during and after firing.

i. Before firing:—

- (a) Ensure that the barrel is absolutely dry and free from oil.
- (b) See that the striker stud is screwed tightly home.
- (c) See that the copper washer is on the breech piece.
- (d) See that the breech piece is screwed tightly home.
- (e) Ensure that the flats on the breech piece are so positioned that it will lock into the base-plate.

ii. During firing:—

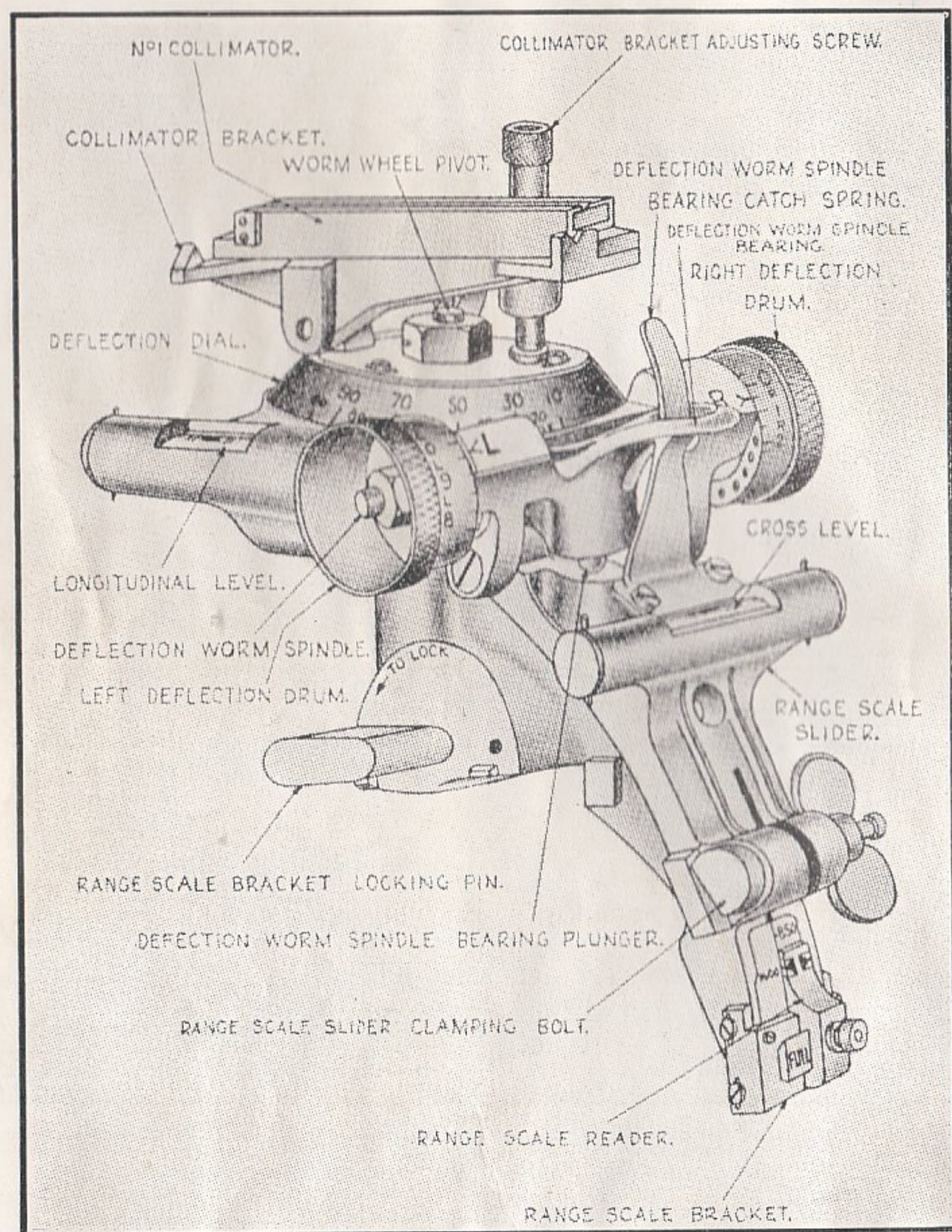
- (a) Watch the breech piece to see that it is not coming unscrewed.
- (b) When opportunity permits, unscrew the breech piece and remove fouling on the striker stud, clean the barrel with dry rag over the cleaning rod and screw the breech piece tightly home.

iii. After firing:—

- (a) Remove the breech piece with striker stud.
- (b) Wash out the bore with fresh hot water and allow it to drain.
- (c) Dry out the bore and, when cool, oil it by means of a cloth tied over the cleaning rod.
- (d) Clean and oil the breech piece and striker stud.
- (e) Re-assemble, ensuring that the copper washer is in position and that the breech piece is tightly screwed home.

SIGHT, 3-IN. MORTAR, MARK I
(Arrangement)

PLATE III



[To face page 13.]

SECTION 13.—THE TESTING AND ADJUSTMENT
OF THE SIGHT

(See Plate III)

The sight should be frequently tested to prove that it is in adjustment both for direction and elevation. Errors in direction may be due to the displacement of the worm wheel bracket, while errors in elevation may be due to the range scale bracket or the range scale slider being bent or damaged.

LESSON 4.—TO TEST AND ADJUST FOR DIRECTION

Instructor's Notes

Stores:—

- 4 direction posts from which to suspend two plumb lines.
- 2 plumb lines.
- Mortar complete.

1. To test for direction:—

- i. Choose a distant aiming point on which the mortar can later be laid. Suspend two plumb lines about 5 yards apart and align them accurately on to the selected aiming point.
- ii. Mount the mortar about 10 yards in front of the plumb lines. The base-plate must be moved and the barrel traversed until the plumb lines accurately bisect the barrel throughout its length. The barrel is now laid on the same point as the plumb lines.

Now bring the cross-level bubble central and check the aim with the sight, which should be on the selected aiming point. If it is not, the sight requires adjustment for direction.

2. To adjust for direction:—

Loosen the three screws in the elongated slots in the worm wheel bracket and move the collimator bracket in the required direction until the sight is laid on the aiming point. Having made the adjustment, tighten the screws and re-check the aim.

Note.—The three screws referred to are those of which the heads project above the worm wheel bracket.

LESSON 5.—TO TEST AND ADJUST FOR RANGE

*Instructor's Notes**Stores:—**Field clinometer and mortar complete.***1. To test for range:—**

i. Lay the mortar for elevation at an angle of 69 degrees 47 minutes, which is the elevation corresponding to 1000 yards range with charge 2. To do this set the field clinometer at the required angle and place it on the clinometer plane on the barrel. Position the barrel by means of the operating handle until the clinometer bubble becomes central.

ii. Bring the longitudinal bubble of the sight central by operating the wing nut and the range scale slider. The sight should now read 1000 yards on the charge 2 scale. If it does not give this reading, adjustment is necessary.

2. To adjust for range:—

Position the range scale reader for full charge. Slacken the wing nut of the range scale slider and bring the longitudinal bubble central. Tighten the wing nut.

Slacken the four screws adjusting the range scale reader and position the reader to read 1000 yards on the charge 2 scale. Tighten up the adjusting screws and check that the bubble is still central.

Note.—The screws adjusting the range scale reader are positioned two on each side of the range scale slider and pass through the elongated slots in the range scale reader.

ELEMENTARY TRAINING

SECTION 14.—AIMING AND LAYING

LESSON 6.—AIMING

*Instructor's Notes**Stores:—**Mortar complete.**Blackboard or diagrams.***1. Aiming with the mortar sight.***Explain:—*

- i. The rules of aiming, using a blackboard or diagrams; that the eye should be about three inches from the sight and that either eye may be used, but preferably the right.
- ii. That the tip of the arrow must be laid on the lowest central part of the aiming mark.
- iii. That with the open sight the aim will be taken as for the rifle.

2. The squad will view an aim laid by the instructor and will practise.

3. Aiming for direction.*Explain:—*

How to aim, using the traversing handle and the sight adjusting screw.

4. The squad will view an aim laid by the instructor and will practise.

LESSON 7.—LAYING FOR DIRECTION

*Instructor's Notes**Stores:—**Mortar complete.*

1. Explain how to lay for direction, introducing the use of the cross-level bubble.

The instructor will act as No. 2 and will detail one of the squad to act as No. 1.

2. While No. 1 is obtaining direction as in Lesson 9, demonstrate and explain that the No. 2 must keep the cross-level bubble in the centre of its run.

3. Practise squad in the duties of No. 2.

Note.—Before starting each lay, the cross-level bubble will be central, but the mortar will not be laid on the aiming mark.

LESSON 8.—LAYING FOR ELEVATION

Instructor's Notes

Stores:—

Mortar complete.

1. Explain the graduations on the range scale, and how to set the slider and charge indicator.

2. Demonstrate how to bring the bubble central in the longitudinal level by the use of the operating handle.

3. Practise squad in:—

i. Setting the slider and charge indicator.

ii. Levelling the bubble combined with (i) above.

LESSON 9.—LAYING FOR ELEVATION AND DIRECTION

Instructor's Notes

Stores:—

Mortar complete.

1. Explain that this lesson is a combination of Lessons 7 and 8 and that, in order to reduce the time taken to lay the mortar, the following is the correct procedure:—

i. No. 1 will set the range scale slider and, by looking through the sight, he will note the approximate distance in degrees between the present aim and the aiming mark ordered. He will rapidly turn the traversing handle in order to obtain approximate direction. He will then lay the mortar for elevation.

Note.—One half turn of the traversing handle deflects the mortar approximately one degree.

ii. No. 2, while No. 1 is laying for elevation, will bring the cross-level bubble central.

iii. Nos. 1 and 2 will lay accurately for elevation and direction.

2. Practise squad in the duties of Nos. 1 and 2.

3. Explain the use and setting of the deflection dial and drum.

4. Practise squad.

SECTION 15.—NIGHT AIMING

LESSON 10.—AIMING AND LAYING BY NIGHT

Instructor's Notes

Stores:—

Mortar complete, night aiming box, aiming post and torches.

No value will be obtained from this lesson unless it is conducted in a dark room or out of doors under cover of darkness.

The instructor must assist the layers by the use of his torch. On completion of each lay, the instructor must check both the sight bubbles and the aim.

1. Explain the working of the night aiming box and how the lamp fits on to the aiming post.

2. Demonstrate how to obtain approximate direction by aligning the luminous strip of the barrel on the lamp.

3. Demonstrate how to lay the mortar on the lamp.

4. Practice squad in Lesson 9 under conditions of darkness.

SECTION 16.—SIGNALS

Note.—These signals are required for use in the mortar platoon in addition to the field signals given in Infantry Training.

LESSON 11.—FIELD SIGNALS

Instructor's Notes

Stores:—None.

1. Demonstrate and explain the following signals:—

i. **"Action"**—Both arms fully extended, raised from the sides to a position level with the shoulders and lowered again. The motion to be repeated quickly several times.

ii. **"Cease firing"**—The arm swung in a circular motion in front of the body.

2. Practice squad.

3. Demonstrate and explain the following semaphore signals:—

Code letter	A—Detachment commanders or detachment corporals.	} To join immediate superior.
	AA—All N.C.O.S.	
	B—More ammunition required.	
	H—Vehicles to come up.	

4. Practise squad.

LESSON 12.—FIRE CONTROL SIGNALS

Instructor's Notes

Stores:—None.

1. Demonstrate and explain the following signals:—
 - i. **"Acknowledged"**—Used to acknowledge a verbal order which has been received and understood.—The left arm extended above the head and immediately lowered.
 - ii. **"Repeat"**—The left arm remaining extended above the head and "repeat" called for.
 - iii. **"Prepare to fire"**—The fire controller's arm raised above his head.
 - iv. **"Fire"**—The fire controller's arm cut away to the side.
 - v. **"Stop"**—The arm waved horizontally to and fro across the body.
2. Practise squad.
3. Demonstrate and explain the following signals for use during ranging:—
 - i. A shot observed beyond or plus of the target—the arm extended from the shoulder pointing in the direction of the target.
 - ii. A shot observed short or minus of the target—the arm extended from the shoulder pointing away from the target.
 - iii. A direct hit—both arms extended from the shoulder, one pointing towards and the other away from the target.
 - iv. The M.P.I. of a group of rounds—signalled as a plus or minus as the case may be.
4. Practise squad.

SECTION 17.—ELEMENTARY MORTAR DRILL

Instructor's Notes

1. *Object*—To teach the soldier to handle the mortar and ammunition so that in war correct action will be instinctive.
2. *Stores required for all lessons in this section.*—Base-plate, barrel, bipod, sight and case, two bomb carriers with dummy bombs, spare parts bag and two aiming posts.

3. **Safety precautions.**—At the beginning of each lesson, when dummy bombs are used, the instructor will inspect them to ensure that the primary and augmenting cartridges, fuzes and bombs are dummy.

Note.—All executive words of command are in inverted commas.

LESSON 13.—FALL IN AND TAKE POST

Instructor's Notes

The lying position will always be adopted where possible and ground sheets should be used when necessary. When in the lying position, the position of attention will be—arms folded, heels together. The orders "Rest" and "Position" will be given when necessary.

In taking post, the following positions are the most suitable:—

- No. 1 in rear of the base-plate.*
- No. 2 on the right of the barrel.*
- No. 3 on the left of the bipod.*

1. **Lay out of stores.**—Base-plate on the ground facing the front, with it the sight and case. Barrel a short distance to the right of the base-plate, muzzle to the front, with it the spare parts bag. Bipod a short distance in rear of the base plate and barrel, legs to the rear, sight pillar and operating handle on top. Bomb carriers a short distance apart and in rear of the tripod.

2. **"Fall in."**

The instructor details any four men, who will be called a detachment; he falls them in a short distance in rear of the stores facing the front, and numbers them off. The remainder of the squad will be so placed that they can see and hear what takes place.

If at any time the instructor should order **"Fall out 1,"** 1 becomes 4, 2 becomes 1 and so on, and they re-number at once.

3. **"Take post."**

No. 1 doubles to the base-plate. He will see that it is not damaged, that the socket is free from dirt and grit, that the sight is correct and the range indicator towards the bottom of the slider. He will put the sight case over his shoulder. When all numbers have reported to him, he will report **"All correct"** (or otherwise) to the instructor.

No. 2 doubles to the barrel. He will see that the breech piece is screwed home, that the striker is correct, that the recoil spring and buffer ring are attached and that the muzzle cover is on. He will inspect the contents of the spare parts bag and place the strap over his shoulder. When ready, he will report "**Barrel correct**" (or otherwise) to No. 1.

No. 3 doubles to the bipod. He will see that the cradle is central, that the cross-level screw moves easily and is set over the hooks of the cradle, that the sight bracket and pillar are undamaged and free from dirt, that the clamping plate is central and the handle is tight, that the traversing and elevating screws work easily and that the legs move freely. When ready, he reports "**Bipod correct**" or otherwise to No. 1.

No. 4 doubles to the bomb carriers. He will inspect the bombs, see that they are fused and that the safety caps are tight. He will see that the waterproof covers are over the tail units and that all charges are in position. When ready, he reports "**Ammunition correct**" or otherwise to No. 1.

LESSON 14.—MOUNT MORTAR (FLAT GROUND)

Instructor's Notes

1. "*Mount mortar*" should be taught in the following phases:
 - 1st Phase.—The action of No. 1 until he is behind the base-plate with the sight adjusted to charge 2—800 yards.
 - 2nd Phase.—The action of No. 2 until he has unhooked the recoil spring.
 - 3rd Phase.—The complete action of No. 3 combined with the further actions of Nos. 1 and 2.
 - 4th Phase.—The complete action of No. 4.
2. The most convenient way for Nos. 2 and 3 to bring their loads into action is as follows:—
 - No. 2 with the breech piece leading.
 - No. 3 with his left hand under the hooks of the cradle and his right hand at the elevation tube, one leg of the bipod under his right arm and the spikes pointing in towards him.
3. The normal position for the gun numbers when the mortar has been mounted will be the kneeling position.

"Mount mortar."

No. 1 doubles forward with the base-plate and places it on the spot indicated, aligning it on the aiming mark by means of the centre rib. He then moves in rear of the base-plate, removes the sight from its case and sets it at Charge 2—800 yards.

When the bipod has been attached, he aligns the barrel approximately on to the aiming mark by directing No. 3 to move the bipod in the required direction. When satisfied, he orders "**Stamp in.**" He then moves forward, locks the sight in position and takes up his position on the left of the mortar.

No. 2 doubles forward with the barrel and inserts the breech piece into the socket with the clinometer plane towards him. He then turns the barrel until the clinometer plane is uppermost and unhooks the recoil spring from the stop band. On the arrival of the bipod he removes the muzzle cover, guides the barrel into the cradle, attaches the recoil spring to the hooks of the cradle and replaces the muzzle cover. He then elevates the mortar until about six inches of the elevating screw are showing, centralizes the cross-level bubble and takes up his position on the right of the mortar.

No. 3 opens the legs of the bipod and locks the leg stays. He then doubles forward with the bipod and places it, with the spikes on the ground, about one pace in front of the base-plate with the sight pillar and traversing handle to his right. Assisted by No. 2 he then guides the cradle over the barrel and, when the recoil spring has been attached, he moves the bipod as directed by No. 1. He stamps in the shoes of the bipod when ordered and takes up his position in rear and slightly to the right of No. 2.

No. 4 doubles forward with two bomb carriers and places himself in rear of No. 3, putting the bomb carriers on the ground in a convenient place from which to handle the ammunition.

LESSON 15.—DISMOUNT MORTAR (FLAT GROUND)

"Dismount mortar."

No. 1 centralizes the cradle and removes the sight, adjusting it to the bottom of the slider and returning it to its case. He then lies down in rear of the base-plate.

No. 2 removes the muzzle cover, releases the recoil spring and, when the cradle has been removed, attaches it to the recoil stop band. He supports the barrel while the cradle is being removed and then replaces the muzzle cover. He unlocks and removes the barrel from the base-plate and lies down with the barrel beside him a short distance to the right of the base-plate.

No. 3 winds in the elevating screw, slides the cradle off the barrel and doubles round to his right with the bipod to a position a short distance in rear of the base-plate. He closes the legs of the bipod and lies down beside it.

No. 4 tightens up the safety caps on the bombs and fastens the waterproof covers over the tail units. He replaces the bombs in the carriers, secures the lids and doubles with them to a position a short distance in rear of No. 3, where he lies down.

LESSON 16.—MOUNT MORTAR (ROUGH GROUND)

"Mount mortar."

Nos. 1, 2 and 3 act as taught in Lesson 14, up to the alignment of the barrel. When aligning the barrel on the aiming mark No. 3 keeps the shoes off the ground and, when ordered to "Stamp in," acts as already taught.

When the shoes have been stamped in, No. 1 orders "Un-clamp," on which order No. 3 loosens the clamping handle. No. 1 then orders No. 2 to move the barrel until it is aligned on the aiming mark and, when satisfied, he orders "Clamp up." No. 3 tightens the clamp and takes up his position.

LESSON 17.—DISMOUNT MORTAR (ROUGH GROUND)

"Dismount mortar."

The numbers act as taught in Lesson 15 with the following addition:—

No. 3, on reaching his position in rear of the base-plate, centralizes the clamp in addition to his other duties.

LESSON 18.—PROCEDURE ON THE CHARGE BEING ORDERED

1. "Charge . . .".

No. 4 adjusts the charge by removing three secondaries in the case of "Charge 1" or by seeing that all six are intact in the case of "Charge 2." Having done this he replaces the bomb in the carrier until No. 1 reports "On."

Note:—The waterproof cover will not be removed from the tail unit during inspection and adjustment of the cartridges. This duty can be performed with the cover unfastened but not removed.

LESSON 19.—TO LAY THE MORTAR

(See Appendix A. Plate IV.)

1. "No. . . . Detachment, Charge . . . , . . . hundred."

No. 1 acknowledges the order and, assisted by No. 2, lays the mortar as taught in Lesson 9; when laid, he raises his left arm and reports "On."

2. Procedure when the mortar cannot be laid for elevation without moving the bipod.

No. 1 exposes the elevating screw about six inches and orders "Bipod." Nos. 1 and 2 grasp the barrel with one hand and the legs of the bipod with the other. Under the direction of No. 1 they move the bipod nearer to or further from the base-plate, and, when No. 1 is satisfied, he orders "Stamp in." Nos. 1 and 2 stamp in the shoes and complete the laying.

3. Procedure when the mortar cannot be laid for direction without moving bipod.

No. 1 centralizes the cradle and orders "Bipod." Nos. 1 and 2 move the bipod under the direction of No. 1, who, when satisfied, orders "Stamp in." Nos. 1 and 2 stamp in the shoes and complete the laying.

Notes:—

1. In moving the bipod for elevation or direction, it may sometimes be necessary both to centralize the cradle and expose the elevating gear six inches.

2. When the bipod has been moved for direction, the mortar, when laid, should be within four degrees of the centre of the traverse.

LESSON 20.—TO LAY ON POSTS

Instructor's Notes

1. The farther post must be planted first and aligned on the target; then, coming back towards the base-plate position, plant the nearer post aligning it on the first post and the target.
2. When the lay is completed, the cradle should be within four degrees of the centre of the traverse.
3. The instructor will plant two aiming posts and indicate the base-plate position.

1. "Mount mortar."

No. 1 obtains direction for the base-plate by aligning the two left lifting loops on to the aiming posts. The mounting is then completed as in Lesson 14 with the exception that No. 1, when obtaining approximate direction, aligns the sight pillar and not the barrel on to the aiming posts.

2. When ordered to do so, Nos. 1 and 2 lay the mortar as taught in Lesson 9. If No. 1 finds that the line of sight does not pass through the two aiming posts, he moves the base-plate until the aim is correct, ordering No. 2 to assist him if necessary.

LESSON 21.—TO LAY ON AN AUXILIARY AIMING MARK

1. "Mount mortar."

The mortar is mounted with reference to the target, and the auxiliary aiming mark is then indicated to No. 1.

While No. 1 is setting the range scale slider, the angle of deflection between the auxiliary aiming mark and the target is ordered.

E.g. "Right two owe degrees."

No. 1 acknowledges and sets the deflection dial and/or drums accordingly.

Nos. 1 and 2 lay on the auxiliary aiming mark.

2. "Zero dials—Pick up aiming mark."

When No. 1 has reported "On," the order "Zero dials, pick up aiming mark" is given. No. 1 zeros the dials and, by means of the collimator adjusting screw only, aims at a convenient aiming mark and reports "On." If no convenient aiming mark is available, No. 2 will plant an aiming post.

Notes:—

1. Auxiliary aiming marks to the left of the target should be chosen whenever possible since the barrel obstructs the line of sight to the right.

2. The angle between the auxiliary aiming mark and the target must be measured by hand or by graticules from a point close to the mortar position.

LESSON 22.—TO FIRE

(See Appendix A, Plate VI)

1. "On."

When No. 1 reports "On," No. 3 removes the safety cap and passes the bomb, vanes foremost, to No. 2.

No. 2 takes the bomb with his left hand on the top near the fins and with his right hand underneath near the fuze.

No. 3 immediately takes another bomb from No. 4 and this procedure continues during firing.

2. "Fire."

No. 1 lowers his left arm, removes the muzzle cover and orders "Fire."

No. 2 removes the waterproof cover, places the bomb in the barrel vanes foremost and, when the lower guide band is below the muzzle, releases the bomb. He then draws his hands clear of the barrel.

As soon as the mortar has fired, No. 1 replaces the muzzle cover and relays at once, assisted by No. 2.

3. "... rounds."

When more than one round is ordered, No. 1 acknowledges the order and No. 4, assisted by No. 3, prepares the requisite number of rounds. When No. 4 has reported that the rounds are ready, No. 1 reports "On," and the procedure laid down in paragraphs 1 and 2, above, is carried out for the first round.

For the remaining rounds of the group, the order "Fire" is not given by the fire controller; therefore No. 1 orders "On" and "Fire," relaying after each round until the rounds ordered have been fired. He removes and replaces the muzzle cover before and after each round.

4. "... rounds—Rapid."

Gun numbers act as taught in paragraph 3, above.

On receipt of the order "Fire," No. 1 orders "Fire" once only, the remaining bombs being passed up and fired as quickly as possible. If necessary, No. 1 maintains elevation and direction by means of the elevating and traversing handles, but, should the mortar become badly displaced, he orders "Stop," relays the mortar and orders the fire to continue.

No. 1 will not replace the muzzle cover on the barrel until the rounds have been fired; Nos. 1 and 2 will then relay.

5. "Three (or five) round groups—Rapid."

This order indicates that groups of rapid are to be fired without the number of rounds or the rate being repeated for each group. Nos. 1 and 2 relay after each group.

6. "Stop."

No. 1 acknowledges the order and orders "Stop." He replaces the muzzle cover and, assisted by No. 2, relays the mortar. Should No. 2 have a bomb when the order "Stop" is received, he passes it back to No. 3, who replaces the safety cap and passes one bomb back to No. 4.

Bombs will be passed back vanes foremost.

*Note:—*Prepared rounds will not be left in the open, but will be returned to the bomb carriers until required by No. 3.

LESSON 23.—ACTION AND CEASE FIRING

Instructor's Notes

Before ordering action, the instructor will order a charge and range, and indicate an aiming mark and a position for the base-plate.

1. "No. . . . Detachment, Charge. . . , . . . hundred, Action."

The detachment performs the duties laid down in Lessons 14 and 19 with the following exceptions:—

No. 1 sets the range scale slider at the charge and range ordered instead of Charge 2—800 yards and he positions the bipod so that the elevation can be obtained without further movement during the laying.

2. "Cease firing."

The detachment performs the duties laid down in Lesson 15 with the following addition:—

No. 3 passes back his bomb to No. 4, who fastens on the safety caps and replaces the bombs in the carriers.

The order "Stop" will be given before "Cease firing."

LESSON 24.—CONTROLLED CORRECTIONS

1. To execute an order correcting the range when firing.
"... hundred."

No. 1 acknowledges the order, adjusts the range scale slider to the range ordered and, assisted by No. 2, relays in the normal manner.

2. To execute an order correcting direction when firing.
"Right (or left) . . . degrees."

No. 1 acknowledges the order, adjusts the deflection drum to the figure ordered and, assisted by No. 2, relays in the normal manner.

3. Practice squad.

Note:—

When a correction is necessary to both elevation and direction, the correction to direction will not be ordered until No. 1 has acknowledged the new range.

LESSON 25.—RAPID CORRECTIONS

1. "Check turns."

This order implies that rapid corrections *may* be necessary during the shoot and therefore all necessary arrangements

must be made in order to alter elevation and direction rapidly. This preparation is carried out as follows:—

i. *For elevation.*—No. 1 adjusts the sight up 100 yards and relays for elevation. He counts the number of times that the operating handle is completely turned during this relaying. He reports the number of turns, adjusts the sight to the original range, relays the mortar and reports "On."

ii. *For direction.*—One half turn of the traversing handle gives one degree of traverse.

2. "Rapid corrections."

This order indicates that rapid corrections *will* be used during the shoot and that therefore all corrections to elevation and direction will be made by means of the elevating and traversing handles without reference to the sight.

3. To execute corrections.

i. *For range.*

"Up (or down) . . . hundred (or fifty)."

No. 1 puts the elevation on the mortar, using the operating handle only; he then reports "On."

ii. *For direction.*

"Right (or left) . . . degrees."

No. 1 deflects the mortar, using the traversing handle only; he then reports "On."

4. "Three (or five) round groups—Rapid."

The procedure is the same as for Lesson 22, paragraph 5, only, when this order is given during rapid corrections, Nos. 1 and 2 do not relay after each group.

*Note:—*When a correction is necessary to both elevation and direction, the correction to direction will not be ordered until No. 1 has acknowledged the new range.

LESSON 26.—ACTION ON MISFIRE

No. 1 reports "Misfire."

1. "Stand clear."

This order is given as soon as No. 1 has reported "Misfire."

The detachment falls in in rear of the mortar.

2. "For misfire, Take post."

This order is given after a pause of one minute following "Stand clear".

No. 1 stands in rear of the base-plate.

No. 2 faces inwards on the right of the barrel.

No. 3 faces inwards on the left of the barrel.

No. 4 assumes his normal position

3. "Unload misfire."

No. 1 removes the recoil spring from the cradle and turns the barrel to the unlocked position in the base-plate. He then raises the barrel and allows the bomb to slide slowly forward. Having received No. 2's report regarding the charge, he will, if the charge is faulty, replace the breech piece in the base-plate, lock it, attach the recoil spring and relay the mortar. If No. 2 reports the charge correct, No. 1 unscrews the breech piece and examines the striker before replacing the barrel.

No. 2 places his hands round the muzzle and catches the bomb as it slides from it. He then examines the primary cartridge and reports it correct or faulty to No. 1. He hands the bomb, vanes foremost, to No. 4 and assists No. 3 to relay.

No. 3 steadies the bipod to prevent the cradle from sliding forward. He resumes the firing position when the recoil spring has been attached.

No. 4 receives the bomb from No. 2, replaces the safety cap and changes the primary cartridge if necessary.

As soon as the mortar has been relayed, No. 1 reports "On" and, unless otherwise ordered, "Fire."

LESSON 27.—CASUALTIES

Should casualties occur in the detachment, the mortar can be maintained in action, but with a loss of efficiency. Casualties will be temporarily replaced as follows:—

When one member is absent—One man performs the duties of Nos. 3 and 4.

When two members are absent—The orderly becomes a gun number.

When three members are absent—No. 5 reports at the mortar.

SECTION 18.—TESTS OF ELEMENTARY MORTAR DRILL

Instructor's Notes

Stores:—

Mortar complete.

2 carriers full of bombs.

1. **Object.**—To assist the platoon commander in testing the efficiency of his N.C.Os. and men in elementary mortar drill.

2. Respirators will be worn for all tests, the order "Gas" being given before the executive command which starts the timing for the test.

3. In Tests 2, 3 and 4 the No. 1 only is being tested, but in Tests 1 and 5 Nos. 1, 2 and 3 are all being tested. A N.C.O. or man has therefore nine tests to complete, which are as follows:—

In the duties of No. 1....5 tests....All tests.

In the duties of No. 2....2 tests....Tests 1 and 5.

In the duties of No. 3....2 tests....Tests 1 and 5.

4. Any action carried out contrary to the lessons taught in Section 15 constitutes a failure by that man in that test.

5. The standard of qualification is as follows:—

Tests 1 and 5.....No mistakes.

Tests 2, 3 and 4.....A total of one mistake.

6. The timing in all tests applies to the testing of the No. 1 only, but he should not be failed when, owing to the fault of Nos. 2 or 3, he exceeds the time limit. He should be retested.

Men who are accurate, but who slightly exceed the standard time, should be tested again before being put back for further instruction.

7. Time will be saved in conducting the tests if men are tested in groups of four and all five tests are carried out consecutively. On completion of the fifth test the order "Fall out 1" should be given and respirators may be removed for a short time before the tests are repeated with the men in their new positions.

8. The platoon commander will keep a record of the tests, for which purpose the specimen form on page 30 is suggested.

Rank	Name	Duties of No. 1					Duties of No. 2		Duties of No. 3		Number of failures	Qualification
		Test 1	Test 2	Test 3	Test 4	Test 5	Test 1	Test 5	Test 1	Test 5		
Cpl.	White	P	P	P	P	F	P	P	P	P	1	F
Pte.	Evans	P	P	F	P	P	P	P	P	P	1	Q

P = Passed. F = Failed. Q = Qualified.

TEST 1.—ACTION

Nos. 1, 2, 3 and 4 take post and report stores as for Lesson 13, the instructor inspecting the stores after "Take post" has been completed. An aiming mark and base-plate position is indicated to the No. 1 and the order "Gas" is given.

"No..... Detachment, Charge....., hundred, Action".

The time is taken from the command "Action" until the bomb has reached No. 2 and all numbers are still.

Standard time: 60 seconds.

TEST 2.—FIRE

No. 1 is laid on the aiming mark.

"Fire".

Nos. 1 and 2 act as in Lesson 22.

The time is taken from the order "Fire" until No. 1 reports "On".

Standard time: 12 seconds.

TEST 3.—CONTROLLED CORRECTIONS

No. 1 is laid on the aiming mark.

A correction is ordered for elevation and direction, the former not to exceed 200 yards and the latter 4 degrees.

"....hundred, right (or left).... degrees".

The time is taken from the order "hundred" until No. 1 reports "On".

Standard time: 25 seconds.

TEST 4.—RAPID CORRECTIONS

Conditions as for Test 3, but "Check turns" will have been carried out and the sight set at 1,000 yards.

"Up (or Down).... hundred, right (or left)... degrees".

The time is taken from the order "hundred" until No. 1 reports "On".

Standard time: 10 seconds.

A total of three tests, at the end of which an error of 30 minutes is allowed for direction and 25 yards for elevation.

TEST 5.—CEASE FIRING

The order "Stop" will be given.

"Cease firing".

The numbers act as in Lesson 23, paragraph 2.

The time is taken from the order "Firing" until Nos. 1, 2, and 3 are still.
Standard time: 20 seconds.

SECTION 19.—PACKING THE VEHICLE

(See Appendix B, plates VII VIII and IX)

Object.—To teach the detachment to pack the vehicle in a uniform manner.

LESSON 28.—TO PACK THE VEHICLE

Instructor's Notes

Stores:—

Mortar complete.

Oil can.

Tools.

Carrying harness for Nos. 1, 2 and 3.

Clinometer and case.

Cleaning rod.

Scrubber.

Aiming lamp and box.

Camouflage.

40 bomb carriers.

The packs of the detachment.

2 aiming posts.

Torch.

Megaphone.

4 picks.

4 shovels.

1. Explain:—

- i. That each member of the detachment is responsible for the packing of his own personal equipment, and for those stores which he takes from the truck on "Prepare for action" being ordered. The tools and accessories are the responsibility of the detachment N.C.Os.
- ii. That there is no fixed routine for packing the vehicle, though obviously some stores must be packed before others. On the other hand Nos. 1, 2 and 3 can be packing the box while Nos. 4 and 5 are loading ammunition.
- iii. That, in order that all numbers may learn all duties, the vehicle will now be packed from rear to front, each man bringing forward and packing his own stores when called for.

2. To pack the box.

- i. Stores and accessories as shown in plate VII... .. Detachment corporal.
- ii. Carrying harness... .. Nos. 1, 2 and 3.
- iii. Barrel and spare parts bag... .. No. 2.
- iv. Bipod... .. No. 3.
- v. Base-plate and sight in case.. No. 1.

The No. 2 must be taught how to put the barrel into its compartment so that the box will shut easily.

3. To pack the remaining stores.

- i. 4 picks and 4 shovels, on the floor immediately behind the box... .. Detachment corporal
- ii. Aiming box and camouflage material on top of picks and shovels (off side)... .. Detachment corporal
- iii. 8 packs, on top of i. and ii.
- iv. Aiming posts, torch and megaphone in front beside driver. Detachment orderly.
- v. Driver's pack, beside driver.. Owners.
- vi. Driver's rifle, in rifle rack, on truck... .. Owner.

4. To pack the ammunition.

- i. 25 carriers of H.E., on the near side and centre... .. No. 4.
- ii. 15 carriers of smoke, on the off side... .. No. 5.

SECTION 20.—DETACHMENT DRILL (DAY)

Instructor's Notes

Stores required for all lessons:—

Mortar and vehicle complete.

Personnel required for all lessons:

Complete detachment.

1. **Object:—**

1. To exercise the detachment in the occupation of a position of readiness.
2. To exercise the numbers in fire discipline and maintenance of the mortar in action.
3. To teach those duties of No. 5 which have not already been taught.

2. **The detachment.**—Any five men, who will be called a detachment, are told off as Nos. 1 to 5. The detachment falls in, in file, in front of the vehicle: right file Nos. 1, 3 and 5; left file Nos. 2 and 4. The detachment corporal falls in in front of the leading file.

LESSON 29.—PREPARATION FOR ACTION

“Prepare for action.”

The detachment doubles to the following positions at the vehicle:—

No. 1 at the rear off corner.	} In the rear of vehicle.
No. 2 at the rear near corner.	
No. 3 in the centre.	
No. 4 on the near side at the rear corner.	
No. 5 on the off side at the rear corner.	

No. 3 unties the ropes of the cover, Nos. 1, 2, 4 and 5 loosen the ropes from the hooks and Nos. 4 and 5 roll back the cover to the front of the vehicle.

Nos. 1 and 2 drop the tail board and No. 3 opens the mortar box and drops the front.

No. 1 removes the sight case and base-plate and doubles to the front clear of the vehicle.

No. 2 removes the spare parts bag.

No. 3 removes the bipod and doubles to his place in rear of No. 1.

No. 2 removes the barrel and doubles to his place on the right of No. 1.

No. 4 drops the side of the vehicle.

No. 5 moves to the near side.

Nos. 4 and 5 remove the number of bomb carriers ordered, the normal being six; they then square off the vehicle and replace the cover.

No. 4 takes two carriers and doubles to his position in rear of No. 3.

No. 5 takes the remaining carriers and doubles to a position in rear of No. 4. The number of journeys he makes depends on the amount of ammunition ordered.

If smoke is ordered, Nos. 4 and 5 each drop their respective sides of the vehicle. No. 4 removes one carrier of H.E. and then moves over to assist No. 5 in removing the necessary amount of smoke; he takes forward one carrier of H.E. and one of smoke.

LESSON 30.—PREPARATION FOR ACTION (LONG CARRY)

1. The procedure is the same as for Lesson 29, with the following additions:—

- i. Nos. 1, 2 and 3 each take their carrying harness from the box in addition to their other stores.
- ii. The detachment corporal details ammunition loads according to the amount of ammunition ordered and the length of carry.

2. It is impossible to lay down the loads for a long carry and this duty must be left to the detachment corporal. It should never be less than four carriers for the initial carry and should usually be more. Loads may be changed during the carry and the following are often available to assist in addition to the normal gun numbers:—

Detachment corporal, orderly and truck driver.

LESSON 31.—ACTION

“No.... Detachment, Charge..., ...hundred, Action.”

Nos. 1, 2, 3 and 4 act as in Lesson 20.

No. 5 stacks the carriers in a convenient position for the handling of the ammunition by Nos. 3 and 4, and returns to the vehicle.

Note.—While the detachment is in action, all methods of laying should be practised.

LESSON 32.—CEASE FIRING

1. “Cease firing.”

When this order is given, the signal for the vehicle is made. Nos. 1, 2, 3 and 4 act as in Lesson 20, No. 4 removing all bomb carriers from the position.

The detachment corporal and No. 5 prepare the vehicle by removing the cover and lowering the tail board; they then move with the vehicle to a position in rear of No. 4.

In the absence of the detachment corporal, this duty is performed by No. 5.

2. “On vehicle.”

No. 1 replaces the base-plate and the sight case.

No. 2 replaces the barrel.

No. 3 replaces the bipod.

Nos. 4 and 5 replace the bomb carriers and secure the tail board.

Nos. 3, 4 and 5 replace the vehicle cover.

When each number has completed his task, he falls in in front of the vehicle in the position which he originally occupied.

Note.—On no account will the barrel be used to lever the base-plate out of the ground. This will be done with a pick.

SECTION 21.—PRACTICAL FIRE CONTROL

Object.—To combine fire control, field duties, fire discipline and ammunition supply in the barrack or camp area before starting detachment exercises in the field.

LESSON 33.—PRACTICAL FIRE CONTROL

Instructor's Notes

Stores:

Packed vehicle complete.

Personnel:

Complete detachment.

Note the mistakes made and point them out at the appropriate time without interfering with the work of the detachment.

Never end the lesson with the mortar in action; always insist on the vehicle being packed and all arrangements being completed for the next move under service conditions.

1. Object.

Explain:—

- i. That the object of the lesson is to exercise the whole detachment in their duties from the moment when the task is given to the detachment commander until the mortar and stores are back on the vehicle before advancing or retiring to the next task.
- ii. That, although the lesson is to be conducted in the barrack area, full use will be made of cover from view and fire.
- iii. That the position now occupied by the vehicle is the position in readiness and that movements of the detachment and vehicle before arriving in this position will be dealt with on detachment exercises in the field.

2. Selection of the observation post and base-plate position.

- i. The detachment commander and his orderly should be taken to a suitable view point from which the tactical situation and the task can be described.
- ii. Allow the exercise to run until No. 1 reports "On."

iii. Comment on the following:—

- (a) Observation post and base-plate position selected.
- (b) Field duties of orderly and detachment corporal.
- (c) Method of obtaining direction.
- (d) Method of control.
- (e) Use of cover.
- (f) Movement of the detachment forward under the corporal or orderly.
- (g) Distributing of loads.
- (h) Drill on coming into action.
- (i) The charge and range ordered.

3. Engagements of targets.

- i. Give the fire controller various types of target introducing smoke and safety problems and, during their engagement, exercise the detachment on the following subjects:—

- (a) Ammunition supply.
- (b) Gas.
- (c) Casualties.
- (d) Misfire.

- ii. Comment on:—

- (a) Method of engagement of target.
- (b) Control.
- (c) Fire discipline.

4. The move to the next task.

- i. Give the fire controller his next task.

- ii. Comment on:—

- (a) The drill for the order "Stop."
- (b) The drill for the order "Cease firing."
- (c) The drill for the order "On vehicle" and the packing of the truck.
- (d) The use of cover.
- (e) The orders to the detachment corporal for the move.

SECTION 22.—DETACHMENT DRILL (NIGHT)

Instructor's Notes

Stores required for all lessons:

Mortar and vehicle complete.

Personnel required for all lessons:

Complete detachment.

The position will previously have been pegged and the line of fire marked out.

LESSON 34.—THE PREPARATION FOR ACTION

1. "For night firing, prepare for action."

The detachment carry out their duties as taught in Lesson 29, with the following exceptions:—

- i. The orderly removes the aiming lamp and torch if not already taken for reconnaissance.
- ii. The detachment fall in in single file in front of the vehicle.

2. The detachment commander plants the aiming lamp and the detachment corporal leads the detachment forward in single file towards the base-plate position.

3. "Action."

No. 1 positions the base-plate accurately between the pegs, supervised by the detachment commander.

Nos. 2, 3 and 4, when ordered, bring forward their stores and mount the mortar as taught in lesson 14.

No. 1, assisted by No. 3, aligns the barrel on the lamp by means of the luminous strip on the barrel.

The N.C.O. on the position assists Nos. 1 and 2 to lay the mortar by the use of his torch.

When No. 1 reports "On," the N.C.O. checks the elevation and direction.

In all relaying the N.C.O. must assist by the use of his torch.

LESSON 35.—TO CEASE FIRING

The detachment carry out their duties as taught in Lesson

1. "Cease firing."

32, with the following exceptions:—

- i. A verbal order or message is given for the vehicle.
- ii. The orderly collects the aiming post, aiming lamp and torch.

2. "On vehicle."

The detachment carry out their duties as taught in Lesson 32, paragraph 2, with the following exceptions:—

- i. The orderly replaces the aiming post, aiming lamp and torch in the vehicle.
- ii. On completion of their duties the detachment fall in in single file in front of the vehicle.

FIELD DUTIES

SECTION 23.—SELECTION OF THE OBSERVATION POST AND MORTAR POSITION

Object.—to teach the detachment commander the principles governing the selection of the observation post, base-plate position and position in readiness.

LESSON 36.—RECONNAISSANCE OF MORTAR AREAS

Instructor's Notes

Stores: None.

The instructor will take the squad to the various mortar areas which have been previously reconnoitred. On arrival in each area he will give the brief tactical picture and mortar task and the squad will select an observation post, mortar position and position in readiness.

1. The observation post, base plate position and position in readiness are selected by the detachment commander, who will often be given assistance by the mortar section commander or the rifle commander under whose orders he has temporarily been placed.

The importance of concealment applies equally to the mortar as to other weapons but, since the essence of mortar support is speed in carrying out the task, detachment commanders must be prepared to forego positions which offer the best advantages for concealment and control in order to produce fire with minimum delay.

2. The observation post and the mortar position must be concealed.

3. The observation post should fulfil the following conditions:—

- i. Have an all round view of the target area.
- ii. Be within voice control of the mortar.
- iii. Have a good view of our own troops.
- iv. Be inconspicuous.
- v. Have a covered approach.
- vi. Have sufficient cover to enable fire control signals to be made.

4. **The mortar position** should fulfil the following conditions:—

- i. Be suitable for the task.
- ii. Afford concealment for the mortar and detachment.
- iii. Have a covered approach.

5. **The position in readiness** should fulfil the following conditions:—

- i. Be so situated that the vehicle can reach it and turn round.
- ii. Be as near as possible to the mortar position.
- iii. Be concealed from enemy observation.

The ideal position in readiness is therefore on the mortar position, but this will seldom be possible owing to the difficulty of concealment.

In order to avoid the delay and exhaustion caused by a long carry, detachment commanders must be bold in the selection of the position in readiness, and the vehicle will frequently have to cross open country at speed on its way thereto.

SECTION 24.—THE OCCUPATION OF A POSITION (DAY)

Object.—To teach the headquarters personnel the necessary field duties:—

- i. Before coming into action.
- ii. While in action.

LESSON 37.—DUTIES BEFORE AND DURING OCCUPATION

Instructor's Notes

Stores:

Sand table.

The duties should be demonstrated on the sand table in full and repeated in order to show which duties may be dispensed with in accordance with the situation. Before conducting headquarters training exercises in the field the instructor should repeat this lesson on the sand table by making the squad perform the various duties, and give the necessary orders while he moves the models on the sand table in accordance with those orders.

1. The duties given in this lesson are arranged to meet ordinary conditions; therefore the commander must decide, in accordance with the situation, whether any details can be dispensed with.

2. Duties before the mortar task has been given:—

i. Platoon commander.

When the platoon is moving as a whole, he is responsible for detailing a covered line of advance and a rendezvous. When the mortars are decentralized to rifle sub-units, he is responsible for detailing to them their role, informing them of his own movements.

ii. Section commander.

When commanding a section under the orders of a rifle sub-unit, he moves with the rifle commander, having given orders to the senior detachment commander as to the disposition of the section.

iii. Detachment commander.

When commanding a single detachment under the orders of a rifle sub-unit, he moves with the rifle commander with a view to engaging targets as required. He details a line of advance which will bring the detachment forward in close touch with the rifle headquarters.

He will always be accompanied by his orderly.

iv. Detachment corporal.

In the absence of the detachment commander he moves the detachment forward in accordance with orders, keeping it in close touch with rifle headquarters. He is responsible for detailing ground scouts.

3. Duties when the mortar task has been given:—

i. Platoon commander.

Mortar detachments will normally be under the command of rifle sub-units. The platoon commander assists detachment commanders in their reconnaissance, when possible, and keeps the commanding officers informed as to their location. He commands those detachments which are temporarily held in battalion reserve and arranges the chain of supply to detachments allotted to rifle companies.

ii. Section commander.

He details a detachment for the task indicated by the rifle commander and so disposes his detachment throughout the action that mortar support will be continuous.

iii. Detachment commander.

- (a) He finds out the position of our own troops, the nature of the target and the type of fire and ammunition required, and estimates the amount of ammunition necessary.
- (b) He reconnoitres for an observation post.
- (c) He reconnoitres for an approximate base-plate position and decides on the method of obtaining direction.
- (d) He reconnoitres for a position in readiness.
- (e) He sends back the orderly to the detachment with orders to lead it to the position in readiness and to send forward the detachment corporal to join him. He also tells the orderly the amount and type of ammunition to be off-loaded at the position in readiness.
- (f) He selects the exact position for the base-plate and decides on the method of control.
- (g) On the arrival of the detachment corporal, he gives him orders as follows:—

Information and intention.
 Charge and range.
 Exact mortar position.
 Position of observation post and method of control.
 Position in readiness.
 Amount and type of ammunition.
 The position to which the vehicle is to go after unloading.

Note:—If the detachment commander estimates that both the detachment and the detachment corporal will arrive in the mortar area at approximately the same time, he will save time by ordering the detachment into action before giving orders to the detachment corporal.

iv. Detachment corporal.

- (a) If present when the detachment reaches the position in readiness, he orders the preparation for action and details ammunition loads.
- (b) If not present when the detachment reaches the position in readiness, he checks all stores at the first opportunity and leads the detachment forward towards the base-plate position.

- (c) He shows the vehicle driver the position to which he will return when signalled for and sends the vehicle to the covered position selected by the detachment commander.
- (d) When the observation post is beyond voice control, he mounts the mortar if ordered to do so by the detachment commander.

4. The platoon serjeant, in all phases of the battle, acts as second-in-command to the platoon commander.

LESSON 38.—DUTIES IN ACTION

*Instructor's Notes**Stores:—**Sand table.*

1. Platoon commander.
 - i. He places himself where he can best carry out the orders of his commanding officer.
 - ii. He sends any fire direction orders required.
 - iii. He regulates the supply of ammunition to his detachment.
 - iv. He controls the intake and outflow of detachments to and from the battalion reserve.
2. Section commander.

He remains at rifle headquarters and ensures that the demands made by the rifle commander are met.
3. Detachment commander.
 - i. He keeps in touch with the tactical situation.
 - ii. He controls the fire of his detachment.
 - iii. He reports to his immediate commander his position, ammunition state, etc.
 - iv. He carries out any fire direction orders received.
 - v. He ensures that his fire does not endanger our own troops.
 - vi. He makes arrangements to continue firing in case observation is at any time interrupted.
 - vii. On completion of his task, he at once regains touch with his immediate commander with a view to affording further support.
4. Detachment corporal.
 - i. He supervises the supply of ammunition from the vehicle to the mortar position.
 - ii. He organizes communication between the mortar position and the vehicle.
 - iii. When the observation post is beyond voice control, he commands at the mortar position.

SECTION 25.—OCCUPATION OF A POSITION (NIGHT)

Object.—To teach the detachment to occupy a position by night, after a daylight reconnaissance has been carried out.

LESSON 39.—THE DAYLIGHT RECONNAISSANCE

Instructor's Notes

Stores:—

- 2 pegs.
- 2 aiming posts.
- 1 digging tool, compass, tape.

1. The reconnaissance party.

This consists of the detachment commander and one other, preferably the orderly, and the stores taken are:—

- i. Two pegs to mark the base-plate position.
- ii. Two aiming posts to mark the line of fire, one of these posts to be fitted with the bracket to hold the aiming lamp.
- iii. One digging tool to prepare the base-plate position if necessary.

2. Procedure.—Having received orders as to his task, the detachment commander reconnoitres a base-plate position and then plants two aiming posts accurately in line with the target or aiming mark. The post to hold the aiming lamp will not be more than 20 paces from the mortar position.

Having prepared the base-plate position, if necessary, he now plants the base-plate pegs accurately in line with the aiming posts. These pegs mark the base-plate position and it is between them that the No. 1 puts the base-plate when he arrives after dark; they must therefore be sufficiently far apart to allow for this.

Before leaving the position the detachment commander:—

- i. Estimates the range to the target.
- ii. Takes a compass bearing of the direction of the aiming posts from the base plate position.
- iii. Selects a rendezvous } To coincide
- iv. Selects a position in readiness } where possible.
- v. Reconnoitres the route from the position in readiness to the mortar position and marks this route with tape if necessary.
- vi. Makes all necessary arrangements for occupation after dark.

3. Practice.

The instructor will demonstrate the duties and the squad will practise.

LESSON 40.—THE NIGHT OCCUPATION

Instructor's Notes

Stores:—

Mortar complete, aiming lamp and torch.

Personnel:—

Detachment complete.

This lesson should be carried out under cover of darkness, and the position occupied should be the one previously reconnoitred in Lesson 39. All the usual precautions with regard to silence and the exposure of lights will be taken.

1. Procedure.

i. Detachment commander.

He leads the detachment to the position in readiness and then takes the orderly forward, with the aiming lamp, to the mortar position. He plants the lamp on the aiming post and orders the orderly to return to the position in readiness and guide the detachment forward.

On arrival of the detachment he takes command and the position is occupied as taught in Detachment Drill (Night). At the first opportunity he gives all information to the detachment corporal.

ii. Detachment corporal.

On arrival at the position in readiness he orders "Prepare for action", checks all stores carefully and waits for the order to move forward. He moves the detachment forward guided by the orderly.

SECTION 26.—SPECIAL DUTIES

Object.—To teach the headquarter personnel those field duties which are special to defence and rearguard action.

LESSON 41.—DUTIES SPECIAL TO DEFENCE

Instructor's Notes

Stores:—

Sand table.

1. Duties on a decision to occupy a position.

The platoon commander's orders will include:—

- (a) The mortar area and task for each detachment.
- (b) Position of our own troops in the vicinity of the detachment area.

- (c) Amount of ammunition to be off loaded and the percentage to be earmarked for the counter-attack task.
- (d) Rates of fire on the call for defensive fire.
- (e) Signal for defensive fire and the direction from which it will be put up.
- (f) Any special orders for local protection and concealment.
- (g) Orders as to digging.
- (h) Alternative positions.
- (i) Place to which vehicles are to be sent when the position has been occupied.
- (j) Communications.

He gains touch with the rifle and machine gun sub-units in the vicinity of the detachment areas, and makes arrangements for local protection, liaison and safety problems.

2. Duties in the occupation of a position.

i. Platoon commander.

He supervises the work of the detachments, organizes communications and platoon headquarters and reports to his commanding officer when all arrangements are complete.

ii. Section commander.

He ensures that the orders of the platoon commander are carried out by the detachment of his section.

iii. Detachment commander.

On arrival at the position, he:—

- (a) Orders the mortar to be mounted and laid on its first task in the normal manner, and ensures that it can be fired under all conditions of light.
- (b) Prepares a range card.
- (c) Posts a sentry.
- (d) Arranges for local protection and concealment.
- (e) Instructs all ranks as to the signal for defensive fire, the direction from which it is to be sent up and the mortar action on receipt of the signal.
- (f) Organizes the digging to provide cover for the mortar and control post.
- (g) Informs the detachment corporal where to send the vehicle.
- (h) Sends the orderly to platoon headquarters to report the detachment in position.

- (i) Obtains full details regarding the counter-attack task.
- (j) Ensures that all ranks have full information.
- (k) Makes out a sentry and duty roster for day and night.
- (l) Gains touch with the rifle companies in the immediate vicinity and ascertains details of patrols.

iv. Detachment corporal.

He orders all the stores and the correct amount of ammunition to be unloaded from the vehicle and placed near the mortar. He then sends the vehicle to its rear position.

He, and the No. 5, will normally live at platoon headquarters.

LESSON 42.—DUTIES SPECIAL TO REAR GUARD ACTION

Instructor's Notes

Stores:—

Sand table.

1. Duties during the occupation of the position:—

i. Platoon commander.

- (a) He disposes the detachments in accordance with the orders of his commanding officer and arranges with the commanders of forward rifle companies the rendezvous to which the detachments allotted to them shall proceed.
- (b) He informs detachment commanders from whom they will receive the order to withdraw.
- (e) He arranges to send a mortar representative to report to the officer detailed to reconnoitre the rear position.

ii. Detachment commander.

In selecting the mortar position he should bear in mind the facilities which it affords for quick and covered withdrawal.

2. Duties in action.

i. Platoon commander.

He organizes a platoon rendezvous near to battalion headquarters at which he collects detachments withdrawing with the forward companies, refills them with ammunition and despatches them on their next task.

ii. Detachment commander.

- (a) Before withdrawal, he orders the detachment corporal to reconnoitre the line of withdrawal.
 (b) He issues preliminary orders regarding:—
 (i) The line of withdrawal.
 (ii) The next task and rendezvous

3. Duties on withdrawal:—

i. Detachment commander.

On receipt of the order to withdraw, he gives it personally to the detachment, and, when clear of the position, he joins the rifle commander whom he is supporting.

ii. Detachment corporal.

He orders the vehicle to the pre-arranged position and turns it round. He then orders No. 5 to take up any extra ammunition that may be required before the final withdrawal from the position. He leads the detachment to the rear by the reconnoitred route, keeping in close touch with rifle headquarters.

SECTION 27.—PREPARATION FOR THE BASE-PLATE AND ENTRENCHING

Object.—To teach detachment commanders how to prepare a base plate position, when necessary, and to teach the detachment the type of emplacement to dig when other cover is not available.

LESSON 43.—PREPARATION OF THE BASE-PLATE POSITION

Instructor's Notes

Stores:—

1 shovel.
 Sandbags.
 Base plate.

1. Explain:—

That the spikes on the base-plate are so designed that the mortar will remain steady under practically all conditions, but that there are the three following exceptions when it is advisable to prepare the base-plate position before firing:—

- i. Very long grass or corn which forms a cushion under the base-plate, preventing the spikes from gripping the earth.
 ii. Very springy ground such as moss or heather.
 iii. Very spongy ground.

2. Remedies.

- Case i. above.. .. Remove the obstruction.
 Case ii. above.. .. Take off the top surface with the shovel.
 Case iii. above.. .. Place sandbags underneath the base-plate.

3. Demonstration.

Demonstrate the remedies given in paragraph 2, above.

LESSON 44.—THE MORTAR EMPLACEMENT

(See Appendix C, Plate X.)

Instructor's Notes

Stores:—

4 picks.
 4 shovels.
 Measuring tape.
 6 pegs.
 Marking tape.

The instructor will peg out the emplacement in accordance with the measurements given in Plate X and detail the squad to their tasks, ensuring that thrown up earth is camouflaged as the work progresses.

Explain:—

- i. That, when the order is received to dig in the mortar, the emplacement dug should hold:—

The mortar complete.
 Nos. 1, 2, 3 and 4.
 All detachment stores and equipment.
 The amount of ammunition ordered.

- ii. That a separate control post will be dug to hold the fire controller and the orderly.
 iii. That the detachment corporal and No. 5 will live at platoon headquarters.

FIRE CONTROL

SECTION 28.—INTRODUCTION

1. The object of mortar fire is to assist the movement of our own troops by neutralizing the enemy fire. This role is entirely offensive and speed is the first essential since the quick production of fire may often be of more importance than extreme accuracy, and time saved may well result in the saving of casualties to our own troops.

2. The mortar fire unit will always be the detachment for the following reasons:—

- i. A single mortar produces a great volume of fire without stoppages or excessive overheating.
- ii. A single mortar is easy to conceal.
- iii. Mortars must be ranged separately and it is not satisfactory to attempt to range more than one mortar at a time.

SECTION 29.—THEORY

Instructor's Notes

This subject must necessarily take the form of a lecture; it is therefore given as headings, on which the instructor should enlarge.

LESSON 45.—THE ZONE OF DISPERSION

Instructor's Notes

Stores:—

Blackboard.

1. Reasons for inaccuracies:—

i. *Inaccuracy in determining the range.*—The maximum probable errors in determining the range are as follows:—

- | | |
|---|-------------|
| (a) From a map of not less than 1/25000 scale.. | 5 per cent |
| (b) By estimation from (a) above.. . . . | 10 per cent |
| (c) By judging distance— | |
| 0 to 500 yards.. | 25 per cent |
| 500 yards and above.. | 15 per cent |

Stress therefore the great importance of a high standard of judging distance among fire controllers in the mortar platoon, and point out that sometimes an infantry range-finder may be available when the maximum probable error is the same as that for the 1/25000 map.

ii. *Inaccuracy due to wind.*—Wind causes variations to both elevation and direction which, in the former, are sometimes very considerable. It is only by experience that fire controllers can learn to judge the speed of the wind and apply it to the opening elevation and direction ordered. Errors due to the wind can easily be rectified by observation of the fall of the round.

iii. *Inaccuracy due to the beaten zone.*—If a succession of rounds is fired from a mortar laid each time at the same elevation and line, those rounds will not fall on the same spot. This is due to:—

- (a) Slight variations from standard in the manufacture of the bomb and charges.
- (b) Slight variations in the muzzle velocity caused by the clearance between the bomb and the barrel.
- (c) Irregular movements of the air in the path of the bomb.
- (d) The degree of accuracy of the instruments, which have to be suitable for use in the field.

If, however, a large number of rounds is fired, they will group themselves round a central point where the bomb holes will be thickest. This point is known as the mean point of impact (M.P.I.).

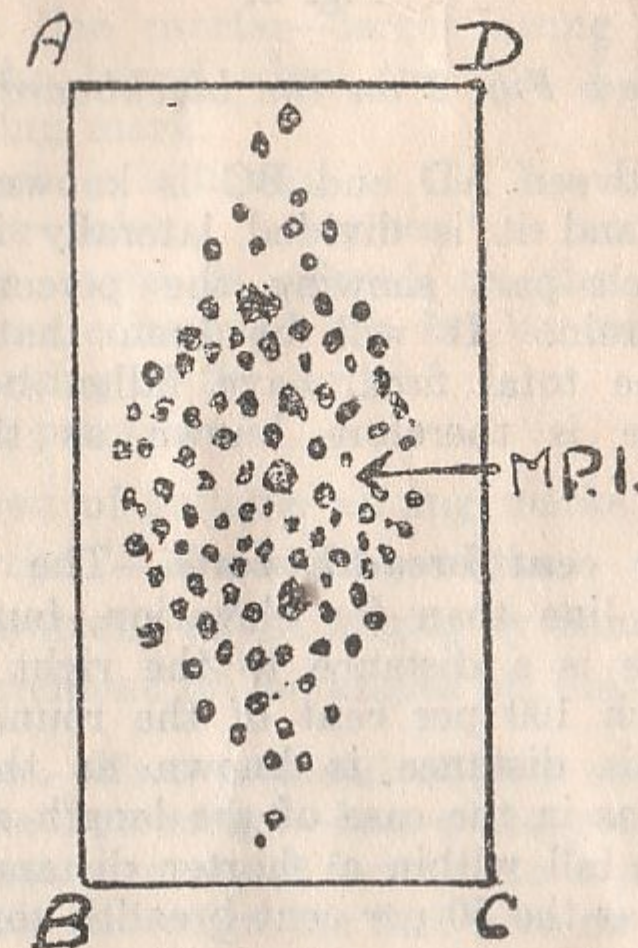


Fig. 1.

Explain Fig. 1 on the blackboard.

2. **The 100 per cent length zone.**—It has been found from experience that, if one hundred rounds are fired all laid at the same elevation and line, they will group themselves round the M.P.I. as follows:—

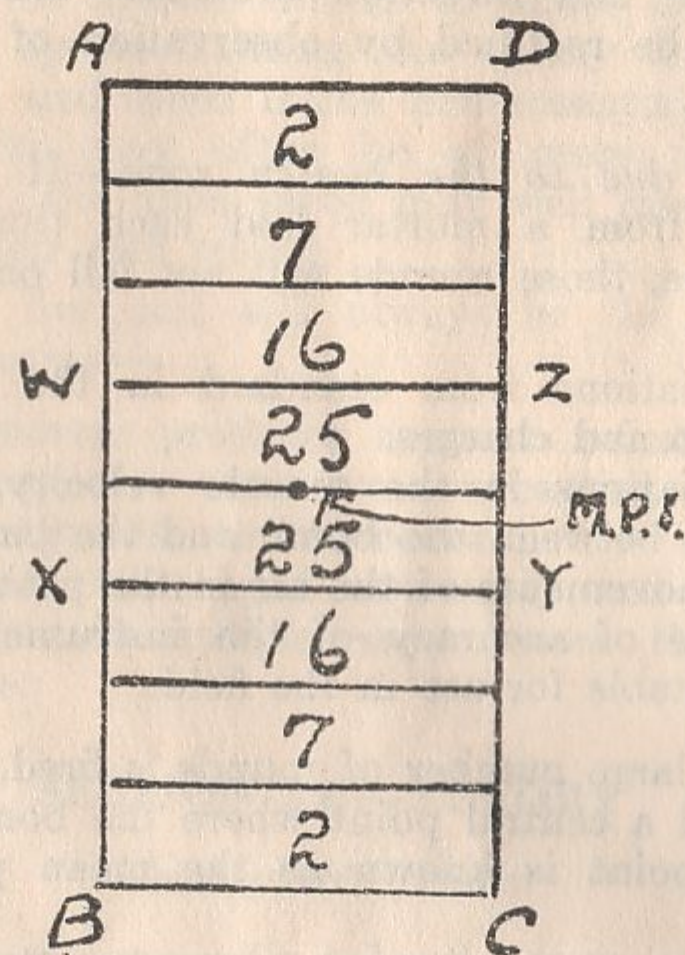


Fig. 2.

Draw Fig. 2 on the blackboard.

The distance between AD and BC is known as the 100 per cent length zone and it is divided laterally into eight parts, the figures in each part showing the percentage of rounds likely to fall therein. It will be seen that 50 rounds, or 50 per cent of the total fired, have fallen between WZ and XY; this distance is therefore known as the 50 per cent length zone.

3. **The 100 per cent breadth zone.**—The mortar is much more accurate for line than for elevation, but in exactly the same manner there is a distance to the right and left of the M.P.I. within which 100 per cent of the rounds fired will fall for direction. This distance is known as the 100 per cent breadth zone and, as in the case of the length zone, 50 per cent of the rounds will fall within a shorter distance nearer to the M.P.I. and known as the 50 per cent breadth zone.

4. Actually these zones vary slightly for every elevation but, for all practical purposes, they are the same size for all rounds fired at the same charge.

The size of the 50 per cent zones is given in the range table and, in all cases, it is one-quarter of the 100 per cent zone.

SECTION 30.—METHODS OF OBTAINING DIRECTION

LESSON 46.—INDIRECT LAYING

Instructor's Notes

Stores:—

2 aiming posts.

Graticuled glasses.

This lesson should be conducted out-of-doors, behind cover in a suitable mortar position.

1. Explain that in order to obtain direction on to the target the fire controller will either:—

i. Select a natural object as an aiming mark,

or

ii. Plant an artificial one (e.g. two aiming posts).

2. **The natural object.**—This should be at least 200 yards from the mortar position and be so situated that it is possible to measure the angle between it and the target from a position close to the mortar. It is unwise to select aiming marks to the right of the line mortar—target owing to the danger of obstruction by the barrel when the No. 1 tries to align the sight on the aiming mark.

The aiming mark is indicated to the No. 1 and the necessary angle "Right (or left) . . . degrees" is ordered. When the sight, set at this angle, is aligned on the aiming mark and Nos. 1 and 2 have completed the lay as taught in Lesson 21, the mortar is pointing at the target.

The squad will practise:—

i. The selection of suitable aiming marks.

ii. The indication of the aiming marks.

iii. The measurement of the angles by hand.

iv. The measurement of the angles by the use of graticules.

3. **Aiming posts.**—Two artificial objects such as aiming posts are planted in the line target—base-plate position. In order to do this it is necessary to crawl forward to a position from which the target is visible and align the first post on the target, bearing in mind roughly the position selected for the base-plate. Then moving back towards the base-plate position, align the second

post on both the first post and the target in such a manner that both posts are visible from the base-plate position. The mortar is then mounted and laid as taught in Lesson 20.

It may be convenient to use one natural object and one aiming post instead of two aiming posts.

LESSON 47.—DIRECT LAYING

Instructor's Notes

Stores: None.

1. Under normal conditions the possibility of laying direct on to the target should never be considered owing to the large target presented by the mortar and detachment in action. Circumstances may arise, however, when the mortar cannot be sited indirect, for instance when dug in in defence, and then the target is indicated by any normal method to the No. 1, who lays on it direct.

2. Instances may occur where, though the target is not visible to the layer, there is some prominent aiming mark on the line mortar—target or mortar—target produced on which the mortar can be laid.

In this case the aiming mark is indicated to the No. 1, who lays on it direct.

3. Examples will be given on the ground of the type of aiming mark described in para. 2, above, and the squad will practise their indication.

SECTION 31.—RANGING

1. The object of ranging is so to adjust the elevation and line that the M.P.I. falls on to the target or very near to it.

2. There are no rigid rules of ranging, the fire controller must therefore use his judgment, bearing in mind the need for speed, and normally he should aim at putting the 50 per cent zone on to the target. When great accuracy is essential, for example when a target has to be destroyed, ranging must continue until it is certain that the M.P.I. is on the target, and more time is required for this purpose.

Ranging is therefore divided into two processes:—

i. Bracketing.

ii. The adjustment of the M.P.I.

LESSON 48.—BRACKETING

(See examples in Appendix D)

Instructor's Notes

Stores:—

Blackboard.

This lesson should take the form of a lecture.

1. Bracketing consists of ensuring that the target lies between two ranges. At first the distance between these two ranges will be 100 yards and the bracket thus obtained is termed the long bracket. By firing at intermediate ranges the target is next bracketed by two rounds differing in range by only 50 yards and this is termed the short bracket.

2. Example (on blackboard):

Estimated range to target... 900 yards.

1st round fired at 900 yards falls minus }

or short... } Long

2nd round fired at 1000 yards falls plus } bracket

or over.

3rd round fired at 950 yards falls minus;

the target is therefore presumably

between 950 and 1000 yards, i.e.

short bracket.

3. In engaging points targets it is necessary to verify the short bracket, i.e. to fire it twice, in order to ensure that the target has indeed been bracketed. Time will be saved, therefore, if two rounds are ordered at the first elevation for the short bracket.

4. Example (on blackboard).

Estimated range to target... 1100 yards...

Round number	Range yards	Observation of burst	Fire controller's order	Remarks
1	1100	plus	"Ten hundred"	To get long bracket.
2	1000	minus	"Ten fifty, two rounds"	Long bracket obtained, starting for short bracket with two rounds.
3	1050	minus	Nil	Short bracket obtained but not verified.
4	1050	minus	"Eleven hundred"	Bottom half of short bracket verified.
5	1100	plus	—	Short bracket verified.

5. Direct hits and contradictions.—If, during bracketing, a direct hit or a contradiction (i.e. one round falling plus and

one minus at the same range) is observed, then that range will be used for fire for effect, subject to the following provision:—

The range producing the direct hit or contradiction must be supported above by a plus round fired at that range plus fifty yards, and below by a minus round at that range minus fifty yards.

6. Examples (on blackboard).

A.—Estimated range to target... ..1000 yards.

Round number	Range yards	Observation of burst	Fire controller's order	Remarks
1	1000	minus	"Eleven hundred" "Ten fifty, two rounds"	To get long bracket. Long bracket obtained, starting for short bracket with two rounds.
2	1100	plus		
3	1050	plus	Nil	Short bracket obtained but not verified.
4	1050	minus	Fire for effect at 1050 yards	Contradiction at 1050 yards. It is supported above by a plus at 1100 yards and below by a minus at 1000 yards. Therefore fire for effect at 1050 yards.

B.—Estimated range to target.....900 yards

Round number	Range yards	Observation of burst	Fire controller's orders	Remarks
1	900	plus	"Eight hundred" "Eight fifty, two rounds"	
2	800	minus		
3	850	minus	Nil	Bottom half of short bracket verified, now firing to verify top half.
4	850	minus	"Nine hundred"	
5	900	minus	"Nine-fifty"	Contradiction at 900 yards, supported below by 800 yards being minus but not yet supported above. Therefore fire at 950 yards to support it above.
6	950	plus	Fire for effect at 900 yards.	

7. In normal circumstances the opening elevation will be the estimated range to the target plus or minus any allowance for wind, but the nature of the country may influence the fire controller to depart from this procedure. This problem is explained in the lesson on observation of fire.

8. **Summary.**—Suggested methods of ranging on and engaging different types of target are given in the lesson on application of fire to types of target but, at this stage three principles may be learned:—

- At ranges up to 800 yards, with good observation, it is usually possible to obtain a short bracket in the first instance.
- At ranges over 800 yards the long bracket is always necessary.
- Whenever a short bracket is necessary, it must be verified.

LESSON 49.—ADJUSTMENT OF THE M.P.I.

Instructor's Notes

Stores:—

Blackboard.

This lesson should take the form of a lecture.

1. As already stated, in dealing with targets requiring destruction, the M.P.I. must be adjusted on to the target and the procedure is as follows:—

Having verified the short bracket, select the mean of the short bracket ranges and fire a group of three rounds.

2. Example (on blackboard).

Short bracket obtained at 1050 yards and 1000 yards.

Fire order—"Ten twenty-five, three rounds."

3. These rounds may fall in any of the four following combinations:—

- Two plus and one minus.
- Two minus and one plus.
- Three plus.
- Three minus.

4. Show these combinations on the blackboard and explain the following procedure:—

Case i. Fire for effect at 1025 yards.

Case ii. Fire for effect at 1025 yards.

Case iii. Fire a group of three rounds at 1000 yards.

Case iv. Fire a group of three rounds at 1050 yards.

LESSON 50.—TO OBTAIN THE LINE DURING RANGING

Instructor's Notes

Stores:—

Rifle and rest.

1. Errors in direction may be caused by the wind or by inaccurate laying; in the former case a correction may be possible before opening fire by deflecting the mortar to windward of the line of fire.

It is important that errors in direction should be corrected at once, since, during ranging, rounds may fall in such a way that they would have been effective on the target had they been correct for line.

2. **Measurement of lateral angles.**—Lateral errors can be measured by:—

i. Graticuled glasses.

ii. Hand angles.

On observing a round to fall incorrect for line, the lateral error is measured to the nearest 30 minutes and the necessary correction is ordered to the mortar.

Corrections for line may be made simultaneously with corrections for elevation.

3. Indicate a target and lay the rifle on the point on the ground at which the round has fallen. The class now view the aim and measure the lateral error:—

i. Using their graticuled glasses.

or

ii. Using hand angles.

They then decide on the necessary correction to be ordered.

LESSON 51.—RANGING INSTRUCTION

Instructor's Notes

Stores:—

Sand model or rifles and rests.

This lesson should be repeated until fire controllers are sufficiently conversant with the principles of ranging to conduct a shoot with live ammunition.

Keep the fire controller far enough away from the rest of the class to prevent him being influenced by their suggestions

1. The class will practise all the lessons of ranging by one of the following methods:—

i. On a sand model.—

(a) Indicate a target and give the fire controller the estimated range to it, then show him on the sand model the fall of every round which he orders,

(b) Comment on his orders.

ii. By the use of rifles and rests,—

(a) Indicate a target and give the fire controller the estimated range to it, then lay the rifle at the point on the ground at which each round which he orders falls.

(b) Comment on his orders.

SECTION 32.—OBSERVATION OF FIRE

Object.—To teach the fire controller to observe mortar fire in such a manner that effect is produced on the target with a minimum expenditure of ammunition.

LESSON 52.—THE USE OF HAND ANGLES AND

GRATICULES

Instructor's Notes

Stores:—

Degree scale and one pair of graticuled binoculars for each student.

(See S.A.T. Vol. I, Pamphlet No. 2, Lesson 7)

1. Hand angles

i. By using the degree scale painted on a wall ensure that every member of the squad determines the angles subtended by his own hand.

ii. As these angles will normally be used in the lying position, each member of the squad should check his angles lying down.

iii. Practise the squad in the measurement of lateral angles by the use of conspicuous objects on the landscape.

2. Graticules.

i. Explain the horizontal angles represented between the graticules.

ii. Explain the vertical heights represented by the graticules.

iii. Practise squad in the measurement of horizontal and vertical angles by the use of conspicuous objects on the landscape.

LESSON 53.—OBSERVATION OF FIRE

*Instructor's Notes**Stores:—**Sand model.*

1. The fundamental principle of all observation of fire is only to make use of rounds which give definite and certain information.

The fire controller should therefore take advantage of every available form of assistance in order to produce the necessary data for the mortar in the shortest possible time with the minimum expenditure of ammunition.

2. **When the line is incorrect.**—In many cases rounds which are off for line give a doubtful indication for range, and they should not be accepted until the line has been corrected.

In the following instances, however, they give an absolute indication for range and can therefore be accepted:—

- i. When the target is on a forward slope and it is quite obvious that the bomb has burst above or below it.
- ii. When the bomb bursts close to some object known to be short of or beyond the target.
- iii. When the smoke produced by the bomb blows in front of the target.

3. Demonstrate these examples on the sand model.

4. **Unobserved rounds.**—In engaging targets in undulating country, rounds falling in dead ground will be unobserved, and the fire controller will be in doubt as to what correction to make. He should therefore try to drop the first bomb on ground where it can be seen even if this does not happen to be very close to the target. If a round is unobserved, the next round should not be fired at the same elevation and line; one or other should be changed according to the lie of the ground.

5. Demonstrate false crests, dead ground and the method of dealing with unobserved rounds on the sand model.

SECTION 33.—APPLICATION OF FIRE TO TYPES OF TARGETS

1. **Object.**—To teach the fire controller the various methods to employ against different types of target.

2. Mortar targets can roughly be classified into two categories, area targets and point targets, but the fire controller must suit the method of treatment to the occasion rather than work by set rules. He should bear in mind that bold corrections during ranging are essential in order to obtain the long bracket in the shortest possible time.

LESSON 54.—NEUTRALIZING A SMALL AREA

*Instructor's Notes**Stores:—**Blackboard.*

This lesson should take the form of a lecture.

1. **Ranging.**—This is probably the most common form of target calling for mortar fire and it requires neutralizing fire to be brought to bear on it with the minimum delay.

As a general rule, the maximum amount of ranging required will be the long bracket.

Choose some suitable point within the area on which to lay the mortar and obtain the long bracket.

2. **Fire for effect:—**

- i. Having obtained the long bracket, fire a group of three rounds for M.P.I. adjustment on the point previously selected.
- ii. Bearing in mind the amount of ammunition available, decide on which parts of the area you will bring fire to bear and how many rounds you will fire in each group.
- iii. Order "Three (or five) round groups, Rapid".
- iv. Measure the switch necessary to bring the mortar from its present line of fire to the line on which you have decided to fire the first group and decide on the necessary alteration in elevation.
- v. Order "...hundred, right (or left)...degrees".
- vi. Cover the area as best you can with the ammunition available by changing the line and/or the elevation between each group of rapid fire.

3. Controlled corrections should be employed for switching the fire about the area, i.e. each group is fired rapid but the corrections ordered will be put on the sight and the lay completed before the next group is fired.

In order to increase the speed, if necessary, the orders for the next group can be given while the bombs of the previous group are still in the air.

4. Draw an area on the blackboard, showing the squad the point on which the M.P.I. has been adjusted and giving them the dimensions of the area and the amount of ammunition available.

5. Practise giving the necessary orders.

6. Practise the engagement of area targets during ranging instruction periods.

LESSON 55.—POINT TARGETS

*Instructor's Notes**Stores:—**Blackboard.*

1. **Targets requiring neutralization.**—Ranging should consist of:—

- i. Obtaining the long bracket.
- ii. Obtaining the short bracket.
- iii. Verifying the short bracket.

When this has been completed, fire for effect should be opened at whatever rate is thought necessary at the mean range of the short bracket.

If an undue percentage of rounds is observed to be falling plus or minus of the target, the elevation should be adjusted up or down by 25 yards.

2. **Targets requiring destruction.**—In mobile warfare this type of target may be rare; examples are: a definitely located defended post or a short length of trench.

Ranging should be carried out to a verified short bracket and the adjustment of the M.P.I.

When this has been completed, a slow rate of fire should normally be employed.

3. Demonstrate the ranging for both types of target round for round on the blackboard.

4. Practise the engagement of point targets during ranging instruction periods.

SECTION 34.—SAFETY OF OUR OWN TROOPS

1. **Object.**—To teach the fire controller the necessary rules in connection with the safety of our own troops.

2. When mortar fire is to be put down close to our own troops, their safety must be the fire controller's first consideration and it is essential therefore that their position and movement is visible from the mortar observation post.

In attack, considerable caution will have to be exercised when observation is obstructed by bad visibility, smoke screens, etc.; and, without a time table, a definite limitation may be imposed on the mortars.

Apart from the above consideration, the mortar, by reason of its high trajectory, and comparatively small 100 per cent zone, is well suited to carry out overhead and flanking fire with safety to our own troops.

3. In solving any problem in connection with the safety of our own troops, the worst possible case must always be taken as a basis for applying the rule.

LESSON 56.—OVERHEAD FIRE (OWN TROOPS STATIONARY)

*Instructor's Notes**Stores:—**Blackboard.*

This lesson should take the form of a lecture.

1. **Method.**—Before firing the first round, the fire controller must find out, in the following way, the minimum range that can be used with safety:—

To the estimated range to our own troops..	700 yards
i. Add the approximate J.D. error (15 per cent)	105 yards
ii. Add the effective radius of the bomb....	100 yards
iii. Add the 100 per cent zone for the charge used	160 yards (or 100 yards)
iv. Add any allowance for head wind.....	nil

The result is the minimum range for safety 1065 yards.

This total would of course be considerably reduced if the range had been obtained from the map.

2. **Procedure:—**

i. If the estimated range to the target is greater than the minimum range for safety, ranging can proceed normally, provided that no round is fired below this minimum range.

ii. If the estimated range to the target is less than the minimum range for safety, two rounds should be fired at the minimum range. If both these rounds fall short of the target, ranging can proceed normally, provided that no round is fired below the minimum range for safety.

iii. If these two rounds fall beyond the target, normal ranging cannot be carried out and a group of three rounds should now be fired at the minimum range for safety. If definite information is available that the M.P.I. of these rounds is further distant from our own troops

than 100 yards plus the 100 per cent zone, then the range can be decreased cautiously. In doing this care must be taken that no round is fired at a range which will bring the M.P.I. less than 100 yards plus the length of the 100 per cent zone from our own troops.

LESSON 57.—OVERHEAD FIRE (OWN TROOPS ADVANCING)

Instructor's Notes

Stores:—

Sand table.

1. It can be assumed that our own troops are stationary when the mortar is called upon to open fire, and therefore the M.P.I. can be adjusted on the target before the troops start to advance. It follows theoretically from this that the troops can advance with safety to within 260 yards of the target if Charge II is being used and to within 200 yards of the target in the case of Charge I.

These figures are arrived at as follows:—

Effective radius of the bomb..	100 yards
100 per cent zone charge 2....	160 yards (charge 1.100x)
	<hr/>
	260

2. The calculations given above assume that it is possible for the fire controller in his observation post to select a point on the ground 260 yards (or 200 yards) from the target, up to which the troops can advance with safety. Since the fire controller is limited to judging distance methods only, this will not be possible.

3. **Procedure.**—The fire controller, having been given his problem, will select a point on the ground in the line of advance at least 300 yards from the target, and he will indicate this point to the rifle commander. He will explain that it will be unsafe for him to continue firing after the attacking troops have reached this point.

4. Demonstrate situations on the sand table to explain the above procedure and insist on the closest possible co-operation between rifle and mortar commander.

LESSON 58.—FLANKING FIRE

Instructor's Notes

Stores:—

Graticuled glasses.

1. When our troops are on the flank of the target, the fire controller must ensure that no round is fired in a direction which will bring the line of fire nearer to our own troops than 200 yards.

2. The following guide for converting 200 yards into degrees at the various ranges should be memorized.

200 yards subtends 23 degrees at 500 yards range.

13 degrees at 1000 " "

8 degrees at 1500 " "

For intermediate ranges between 500 yards and 1000 yards, subtract 2 degrees for each 100 yards.

For intermediate ranges between 1000 yards and 1500 yards, subtract 1 degree for each 100 yards.

Example.

1. 200 yards at 800 yards range = $23^\circ - 6^\circ = 17$ degrees.

2. 200 yards at 1300 yards range = $13^\circ - 3^\circ = 10$ degrees.

3. **Practice.**—Indicate targets on the ground, also that position of our own troops, stating whether they are stationary or advancing. The squad will practise the solution of the safety problems.

SECTION 35.—SMOKE

Object.—To make the fire controller competent to advise on smoke problems and to teach him to fire a smoke screen.

LESSON 59.—FACTORS AFFECTING THE BEHAVIOUR OF SMOKE

Instructor's Notes

Stores:—

Blackboard.

This lesson should take the form of a lecture.

1. The factors affecting the behaviour of smoke are:—

i. Weather conditions.

ii. Ground.

iii. Nature of the smoke producing chemical.

2. Weather conditions:—

- i. *Wind*.—The direction of the wind determines the course of the smoke screen, and the speed of the wind determines the rate of fire necessary.

Neither a very strong nor a very light wind is favourable, since the former demands a high rate of fire while the latter allows the smoke to rise in the form of a pillar. A wind of 7 to 15 m.p.h. is the most favourable throughout the year.

- ii. *Humidity of the air*.—Damp air is favourable and a dull day increases the density of the screen.

3. *Ground*.—Smoke tends to cling to valleys and the sides of a hill, which are therefore favourable areas for the production of a screen. Trees, buildings, etc., tend to scatter the smoke cloud and increase the "pillaring" effect.

4. *The chemical*.—The present smoke producing chemical is white phosphorus which burns with great heat on coming into contact with the air. This results in "pillaring" and consequent loss of screening effect.

5. *Summary*.—The following table grades general conditions into two main headings—"Good" and "Bad."

	Good	Bad
Cold weather.....	Wind 7 to 15 m.p.h. Damp.	Wind under 3 m.p.h. Wind over 25 m.p.h.
Hot weather.....	Wind 10 to 13 m.p.h. Damp and voercast.	Wind under 3 m.p.h. Wind over 25 m.p.h. Sunny.

LESSON 60.—THE POINT OF ORIGIN

Instructor's Notes

Stores:—

Smoke candles.

A fatigue man with smoke candles is required at the target, and, by a system of signals, he can be moved to the required spot.

The necessary pre-arranged signals are:—

- i. *More to your right.*
- ii. *Move to your left.*
- iii. *Advance.*
- iv. *Retire.*
- v. *Halt.*
- vi. *Light a candle.*

1. When ordered to produce a smoke screen, the fire controller must at once consider three factors:—

- i. The direction of the wind in relation to the area to be screened.
- ii. The direction from which screening is required.
- iii. The amount of ammunition available.

2. He then selects his point of origin, i.e. the point on the ground at which he intends to burst his bombs in order to screen the area from the direction required. Since the screen does not become effective until it has travelled about 30 yards, the point of origin should be about 30 yards to windward of the area to be screened.

3. *Ranging*.—Ranging should be reduced to a minimum and carried out with H.E. in order not to lose surprise effect. Having selected the point of origin, the fire controller estimates the range to it and fires one ranging round, provided that the point selected is so situated that that round can be observed.

If observation is likely to prove difficult, he selects some adjacent point which will give him as good an indication as possible of the range and line to the point of origin.

This ranging round often gives valuable information as to the speed and direction of the wind.

4. *More than one point of origin*.—A general principle of all smoke shooting is that one mortar cannot feed more than two points of origin.

Cases will often occur where more than one point of origin is necessary. Examples of these are:—

- i. Head wind.
- ii. Rear wind.
- iii. Area oblique to the line of fire.

The method of feeding these points is given in Lesson 61, "The Production of the Screen", but, in selecting them, fire controllers should endeavour to ensure that in cases i. and ii. the two points are at the same range; in case iii. this will not be possible.

5. Having explained the method of selecting the point of origin, the instructor will indicate an area to be screened, giving the direction from which screening is required. The squad will select the point of origin and the instructor will arrange to have a smoke candle lit at that point.

6. Comment on the selection of the point of origin.

LESSON 61.—THE PRODUCTION OF THE SCREEN

Instructor's Notes

Stores:—

*Mortar complete with dummy ammunition.**This is carried out as a drill with dummy ammunition.*

1. General considerations:—

- i. A smoke screen must always be carefully watched by the fire controller throughout its duration, since adjustments to line, range and rate of fire will often be necessary and these must be ordered immediately.
- ii. The fire controller must remember the long time of flight of the bomb and take this into consideration when ordering corrections.
- iii. The method of fire will depend on whether one or two points of origin are necessary. With one point of origin controlled corrections should be used, but rapid corrections are necessary with two points of origin.
- iv. It may sometimes be necessary to employ a second point of origin during the shoot although originally the fire controller had considered that one would suffice; he must therefore be prepared for this contingency.
- v. Normally the fire controller will regulate the rate of fire himself, and as a guide to the rate necessary the following table will assist:—

(a) Good conditions.....	5 rounds a minute.
(b) Moderate conditions.....	10 rounds a minute.
(c) Bad conditions.....	20 rounds a minute.

2. Procedure—One point of origin:—

i. Take post and fire the ranging round.—

The instructor indicates where this round fell and the fire controller, if he is not satisfied that he has enough data, may fire another ranging round at a different line and elevation.

ii. "Smoke, Check turns, . . . hundred".—

No. 1 reports the number of turns, and, when ready, reports "On."

Note:—This order "Check turns" has only been given in case rapid corrections should become necessary during the shoot, i.e. a second point of origin.

iii. "Fire".—

He then orders fire for each round and the instructor indicates where they are falling.

Any corrections necessary to line or elevation should be made at once. Bad drill and inaccurate laying will result if small corrections are continually being ordered during the shoot, especially if the rate of fire is high.

- iv. During the production of the screen No. 2 will receive another bomb as soon as he has fired the one in his possession.

3. Procedure—Two points of origin:—

i. As for para. 2, above.

ii. "Smoke, check turns, Rapid corrections."

iii. ". . . hundred."

No. 1 reports "On."

iv. "Fire."

He fires two or three rounds on his original point of origin to start the screen at that point.

v. "Right (or Left) . . . degrees, Fire."

He then fires a few bombs on the second point of origin.

vi. "Left (or Right) . . . degrees, Fire."

He then returns to his original point of origin and thereafter feeds each point in turn.

SECTION 36.—SEQUENCE OF FIRE ORDERS

Object.—To teach the fire controller to give the fire order in the correct sequence in order that uniform drill may be ensured at the mortar.

LESSON 62.—THE FIRE ORDER

Instructor's Notes

Stores: None.

A point of aim must be given to the No. 1 before a fire order is started.

Suitable pauses must be made in the fire order to enable the detachment to carry out their duties at the mortar.

Further practice in this subject will be given during "Practical fire control and ranging instruction" periods.

1. The sequence of a fire order is as follows:—

- i. Designation... "No. . . . Detachment."
- ii. Charge... "Charge 1 (or Charge 2)."
- iii. Range... "... hundred."
- iv. The order to fire when No. 1 has reported "On"
... "Fire."

The above order pre-supposes that the mortar is already in action; if this is not the case, the order "Action" will follow the range.

2. **Smoke.**—If smoke is required, "Smoke" will be ordered before giving the range.

3. **Number of rounds or rate of fire.**—Where more than one round is to be fired, the number of rounds and/or the rate of fire will follow the range.

e.g. "Ten hundred, Three rounds"

or

"Five rounds rapid"

"Eight rounds a minute."

4. **Rapid corrections.**—When rapid corrections are required, this order will follow the range.

5. **Acknowledgment.**—If the detachment corporal is in charge at the mortar position, he, and not the No. 1, will acknowledge all orders from the fire controller.

6. **Practice.**—The instructor will indicate targets and the squad will practise the necessary fire orders.

SECTION 37.—METHODS OF CONTROL

1. **Object.**—To teach the fire controller to control the fire of the mortar when the observation post is so situated that voice control is not possible.

2. Except in very open country it will usually be possible to site the mortar within direct voice control of the observation post, and this procedure will invariably be adopted whenever possible.

3. When direct voice control is impossible, a connecting file will be employed who should normally be the detachment orderly, and the fire will be controlled by a combination of voice and signal, known as "Long control."

LESSON 63.—LONG CONTROL

Instructor's Notes

Stores: None.

1. **Procedure.**—The detachment corporal takes command at the mortar, the detachment commander remaining in the observation post with his orderly employed as a connecting file. Orders coming from the observation post can be classified under two headings:—

- i. Those which the detachment commander can signal and which can be interpreted into verbal orders by the detachment corporal at the mortar. These orders are: "Action," "Prepare to fire," "Fire," "Stop," "Cease firing," and the signals which denote the fall of rounds.
- ii. Those which must be given by voice through the connecting fire. These orders are:—
Corrections for line.
Number of rounds.
Rate of fire.

2. **Duty of the detachment corporal.**—By his knowledge of the procedure of bracketing, the detachment corporal at the mortar orders each new range during ranging as a result of the signal he has received denoting the fall of the previous round. E.g. Opening elevation ordered 1100 yards.... Signalled plus.

Detachment corporal orders "Ten hundred."

3. **Duty of the connecting file.**—He repeats all verbal orders until they are acknowledged by the detachment corporal, and, in the event of the observation post being invisible from the mortar, he repeats all signals as well.

4. **Procedure for area targets.**—Having obtained the long bracket and fired the three rounds for M.P.I. adjustment, the fire controller writes out his orders for the engagement of the area and sends them to the detachment corporal at the mortar. A convenient form for these orders is as follows:—

".... round groups rapid."

No. 1 group..... "..... hundred, right (or left)..... degrees,"

No. 2 group "..... hundred, left (or right)..... degrees,"

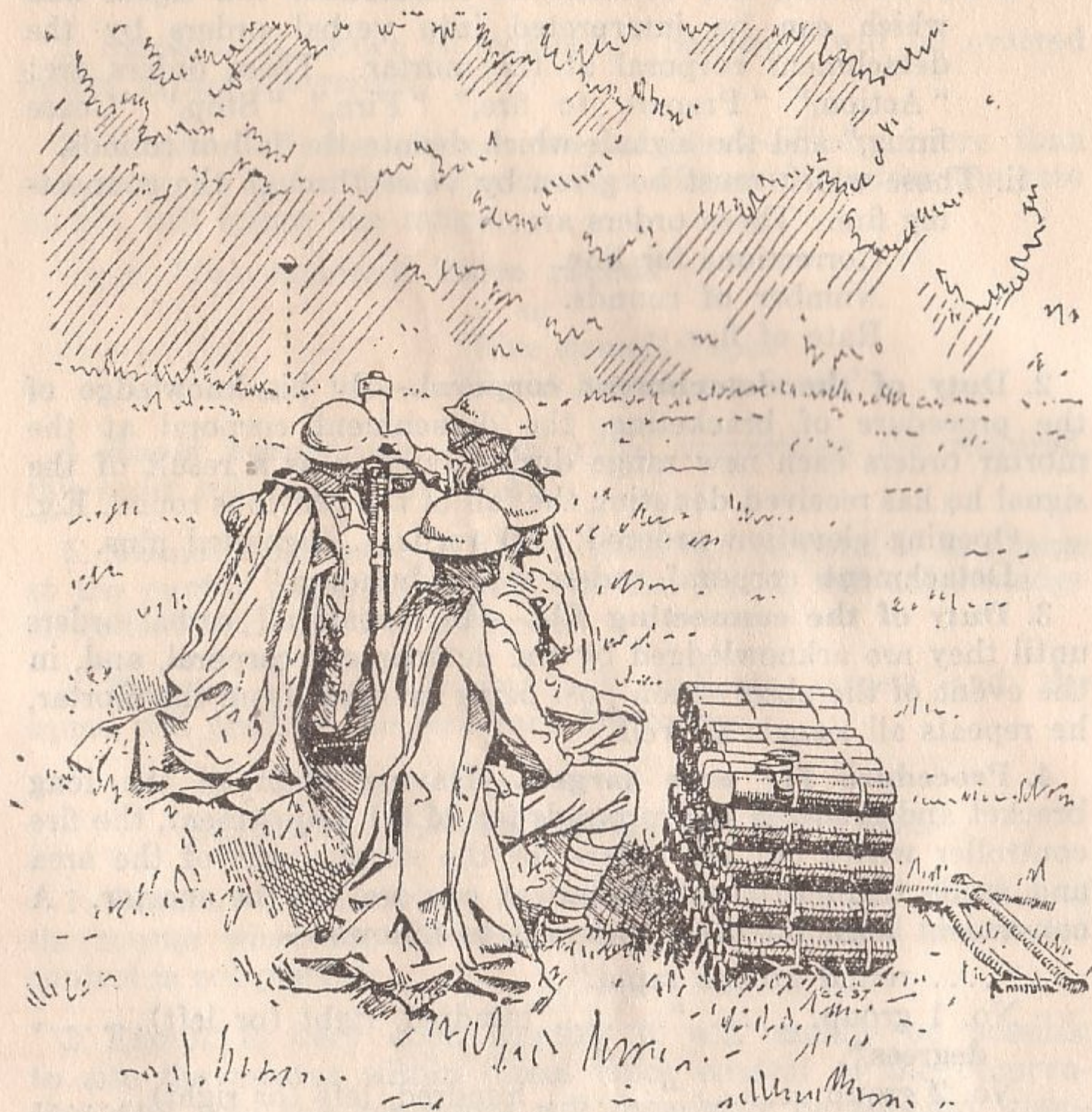
and so on.

5. **Practice.**—The instructor will point out the observation post and base-plate position and will indicate a target. The squad will practise the duties of fire controller, detachment corporal and connecting file while the instructor indicates the fall of the rounds.

APPENDIX A

THE MORTAR DETACHMENT IN ACTION

1. Plate IV.—Range and charge ordered; lay not completed.



Notes.—1. Nos. 1 and 2 laying mortar.

2. No. 4 has prepared three bombs and returned them to the carrier, until No. 1 reports "On."

2. Plate V.—Lay completed, No. 1 has reported "On."



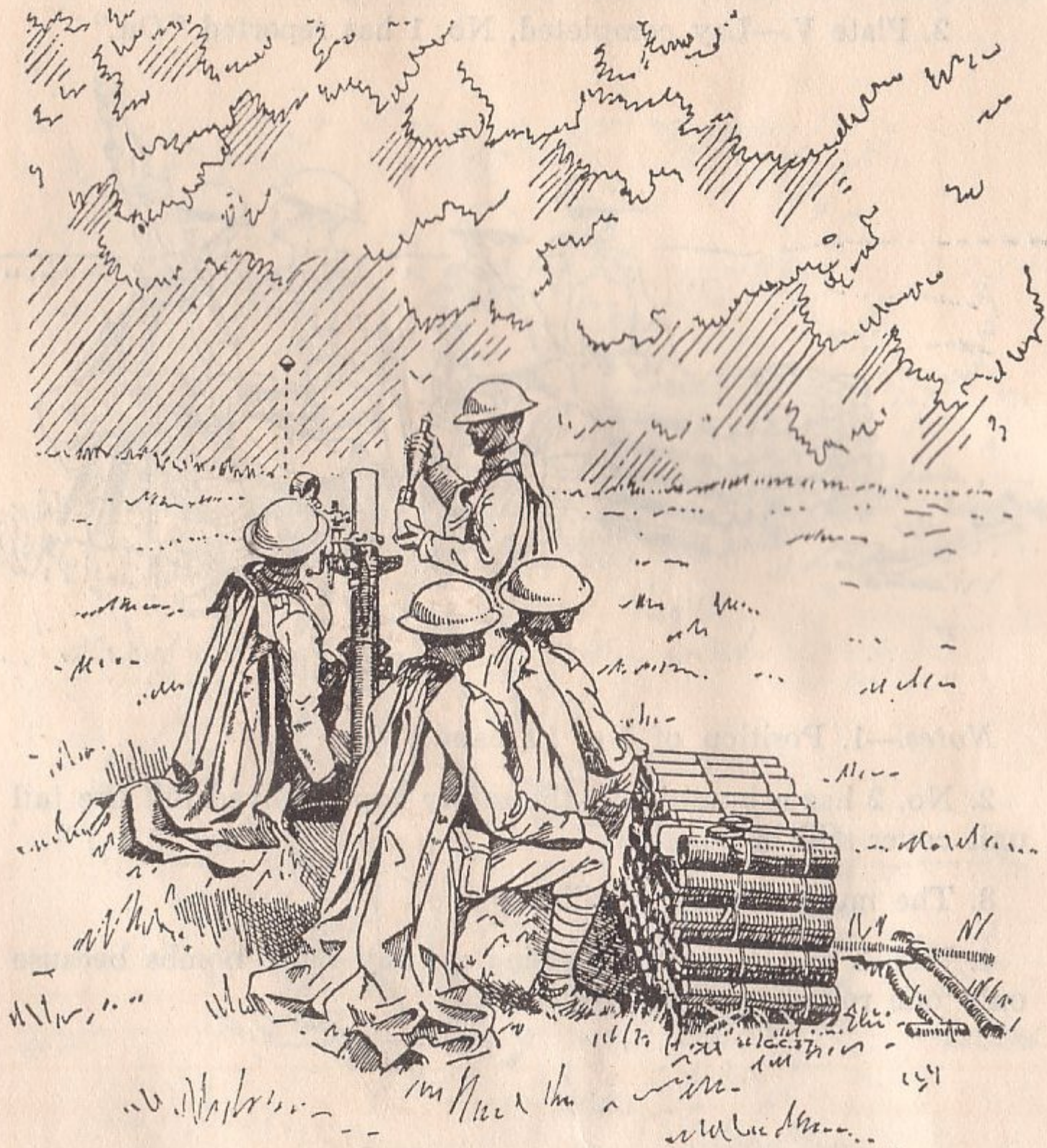
Notes.—1. Position of No. 1's hand.

2. No. 2 has a bomb with the safety cap removed but the tail unit cover still in position.

3. The muzzle cover is still on.

4. Nos. 3 and 4 are not passing up any more bombs because only one round has been ordered.

3. Plate VI.—No. 1 has ordered "Fire."

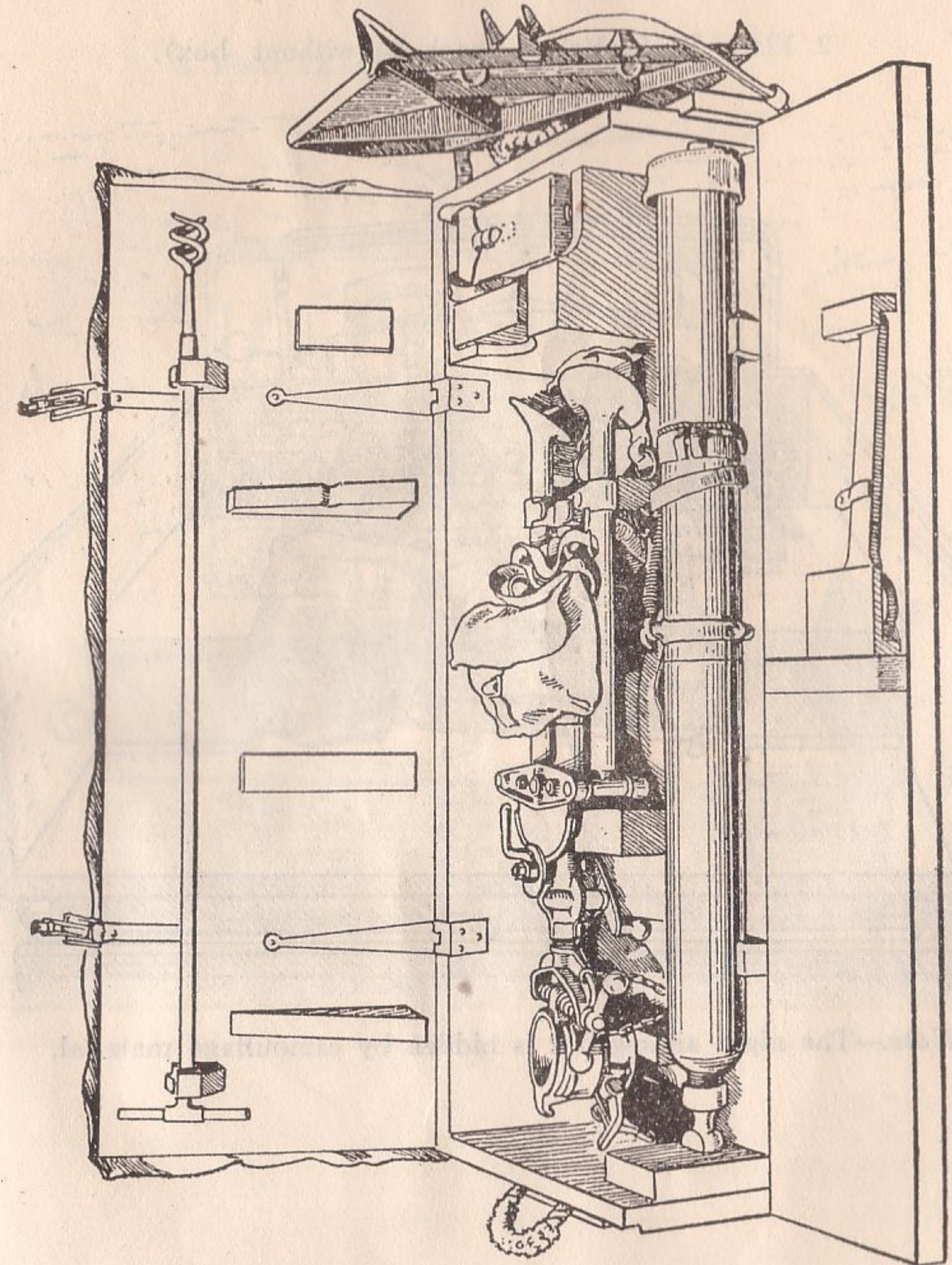


Notes.—1. No. 1 has removed the muzzle cover
 2. No. 2 is removing the tail unit cover.
 3. Only one bomb has been taken from the carrier.

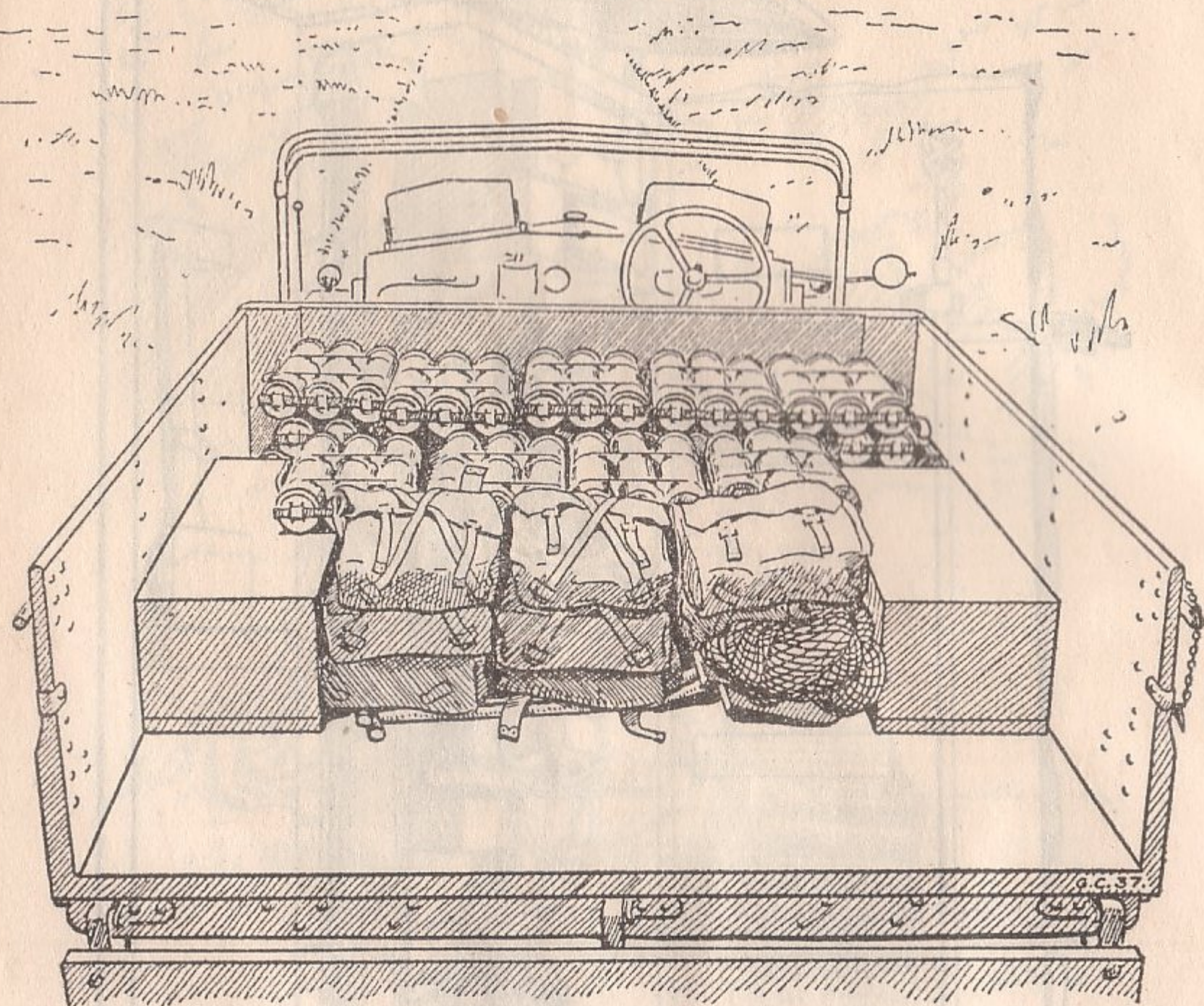
APPENDIX B

PACKING THE MORTAR BOX AND VEHICLE

1. Plate VII.—The mortar box packed.

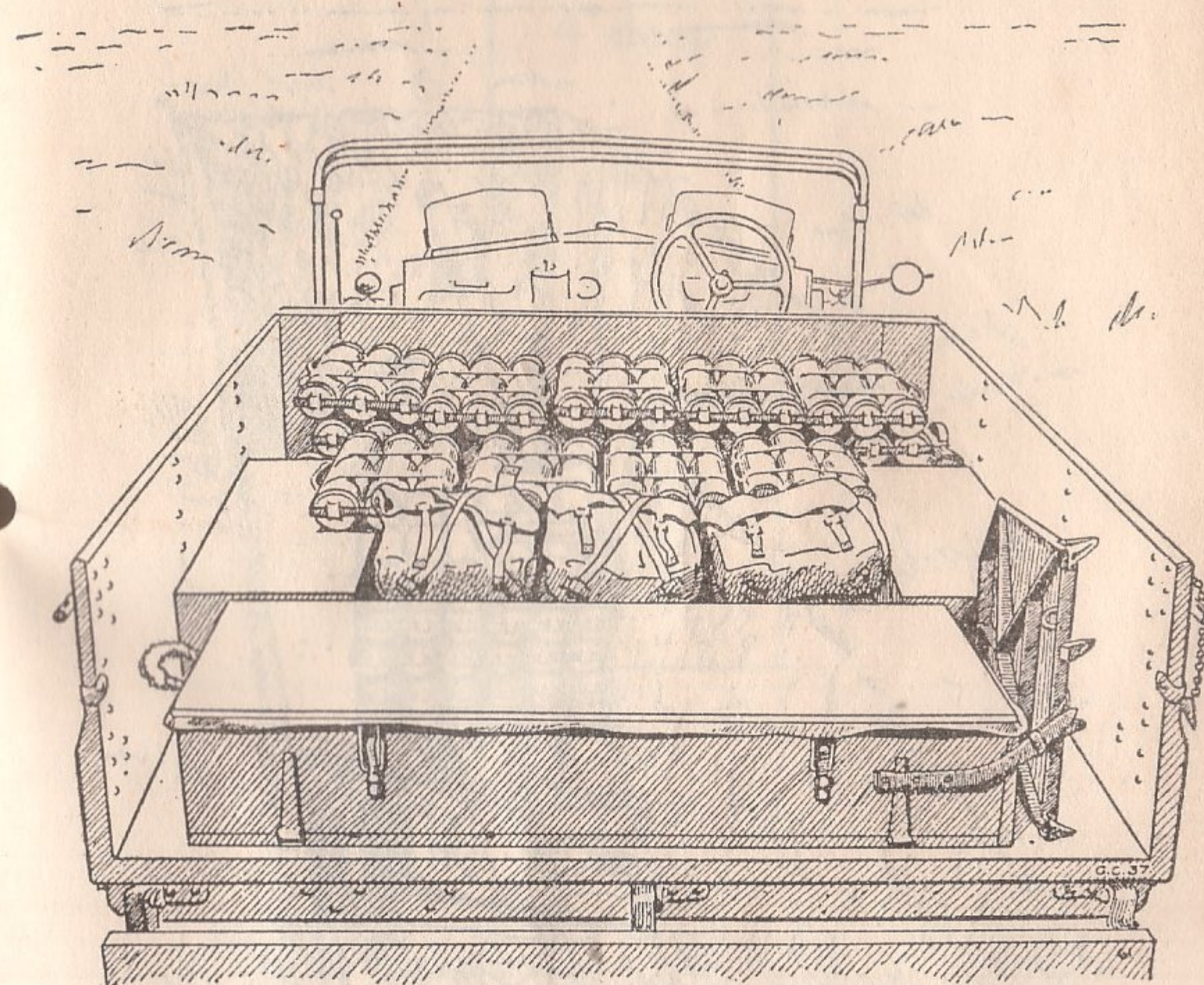


2. Plate VIII.—Vehicle packed (without box).



Note.—The night aiming box is hidden by camouflage material.

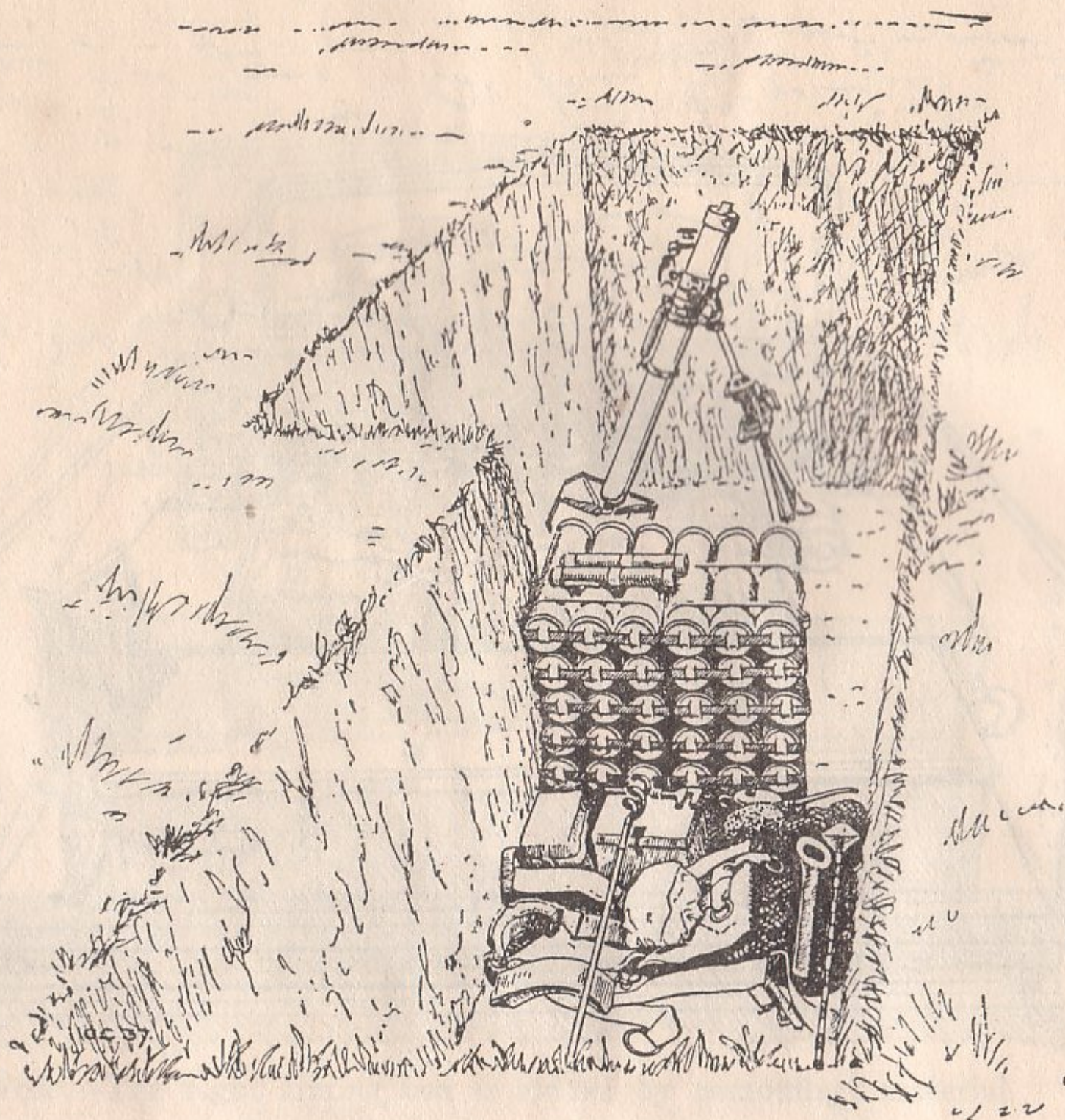
3. Plate IX.—Vehicle packed (with box).



APPENDIX C

THE MORTAR EMPLACEMENT

1. Plate X.—Mortar emplacement showing 1st task completed.



Note.—Space available for more ammunition, men's packs, greatcoats, rations, etc.

2. Details of 1st task (Fig. 3).—

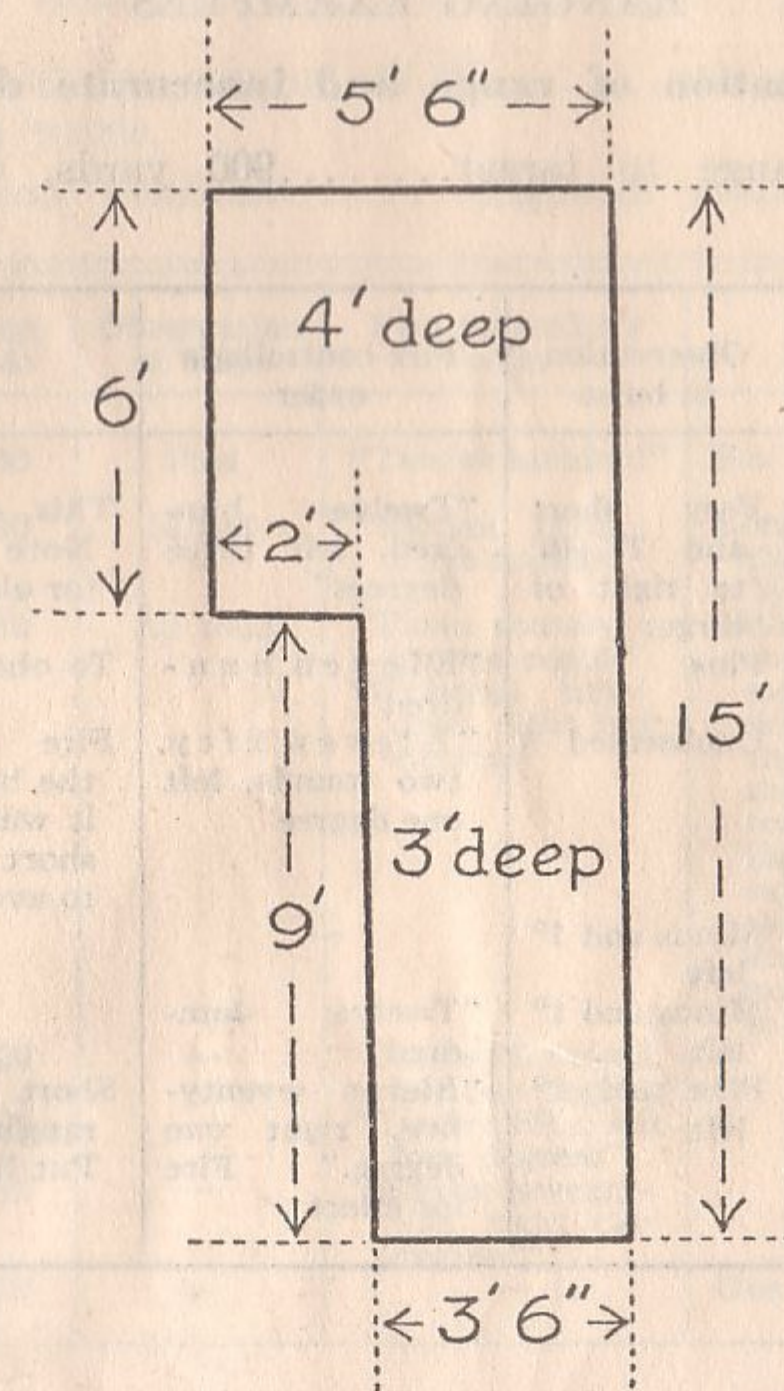


Fig. 3

3. Details of 2nd task.—

- i. Dig the emplacement to a width of 6 ft.
- ii. Dig the emplacement to a depth of 4 ft. 6 in.

This gives a total of 6 ft. of cover, made up as follows:—

	ft. in.
Depth of emplacement.....	4 6
Thrown up earth, 1st task.....	1 0
Thrown up earth, 2nd task.....	0 6
Total.....	6 0

APPENDIX D

RANGING EXAMPLES

1. Bad estimation of range and inaccurate direction.

Estimated range to target.....900 yards, wind blowing left to right.

Shot No.	Range yards	Observation of burst	Fire controller's order	Remarks
1	900	Very short and 2° 40' to right of target	"Twelve hundred, left three degrees"	This shot is useless. Note bold correction for elevation and line.
2	1200	Plus	"Eleven hundred"	To obtain long bracket.
3	1100	Unobserved	"Eleven fifty, two rounds, left one degree"	Fire controller heard the burst and assumed it was in dead ground short of target. Switch to avoid dead ground.
4	1150	Minus and 1° left	—	—
5	1150	Minus and 1° left	"Twelve hundred"	—
6	1200	Plus and 1° left	"Eleven seventy-five, right one degree." Fire for effect	Short bracket verified, ranging completed. Put line correct.

2. Short range.

Estimated range to target 400 yards.

Shot No.	Range yards	Observation of burst	Fire controller's order	Remarks
1	400	Plus	"Three fifty, two rounds"	Long bracket unnecessary. Start to verify short bracket.
2	350	Minus	—	—
3	350	Minus	"Four hundred"	Bottom half verified. Fire to verify top half.
4	400	Plus	"Three seventy-five." Fire for effect	Ranging completed in four rounds.

3. Neutralization of a small area.

Width of area..... 10 degrees
Depth or area..... 100 yards

Point selected for original M.P.I.central, at estimated range of 1300 yards.

Ammunition available.....Eighteen rounds of H.E.

Shot No.	Range yards	Observation of burst	Fire controller's order	Remarks
1	1300	Plus	"Twelve hundred"	For long bracket.
2	1200	Minus	"Twelve fifth, three rounds"	Long bracket obtained, three rounds fired for M.P.I. adjustment.
3, 4, 5	1250	All plus.	"Three rounds groups rapid" "Thirteen hundred, right four degrees"	Although all three rounds at 1250 yards were plus he has sufficient data to neutralize the area. He selects the points in the area round which he would like the groups of rapid to fall, measures the necessary switches and estimates the necessary alterations in elevation.
6, 7, 8	1300	—	"Twelve hundred, left two degrees"	—
9, 10, 11	1200	—	"Twelve fifty, left four degrees"	—
12, 13, 14	1250	—	"Eleven seventy-five, right two degrees"	—
15, 16, 17	1175	—	—	One round unexpended.



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